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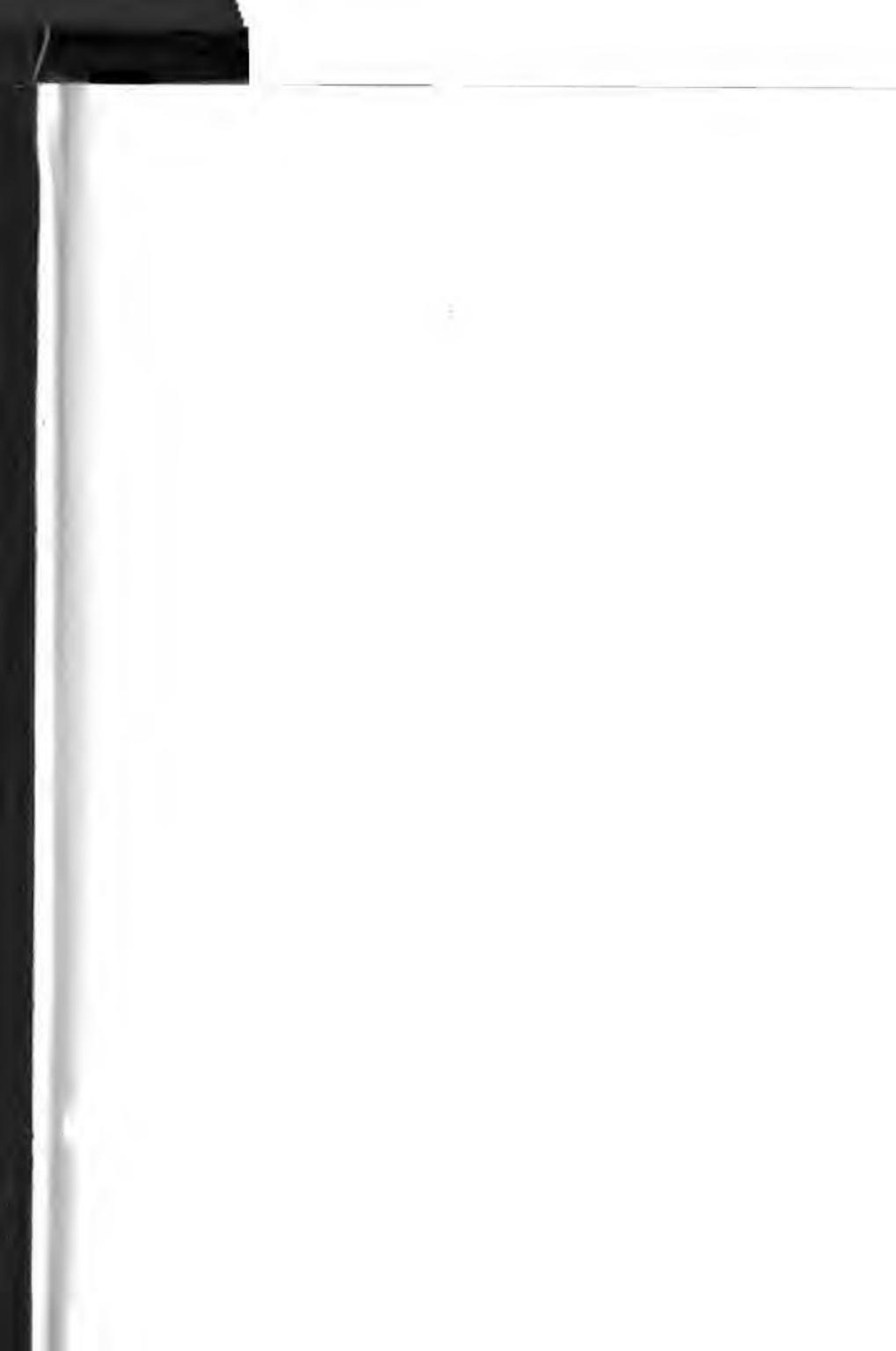
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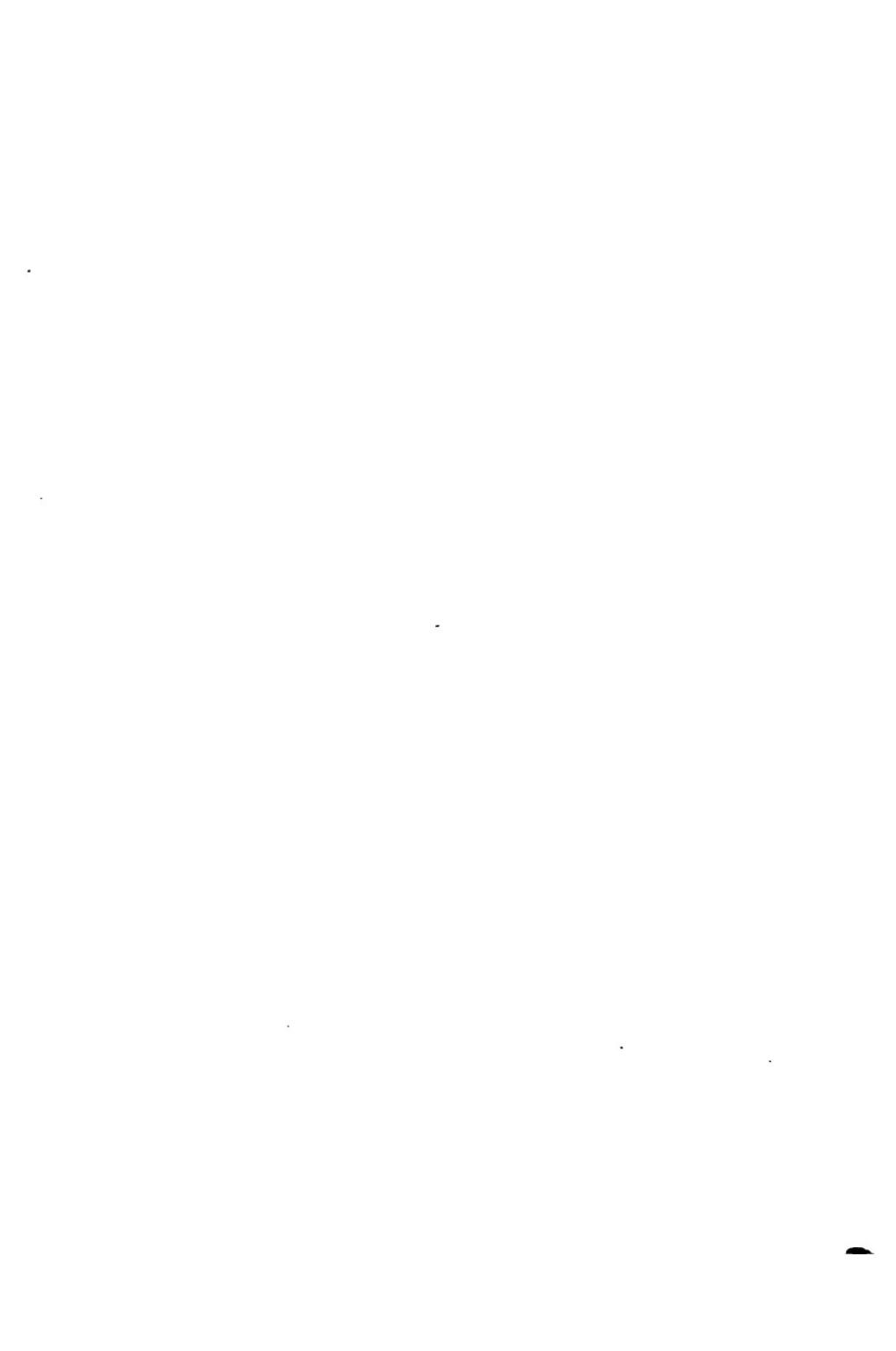
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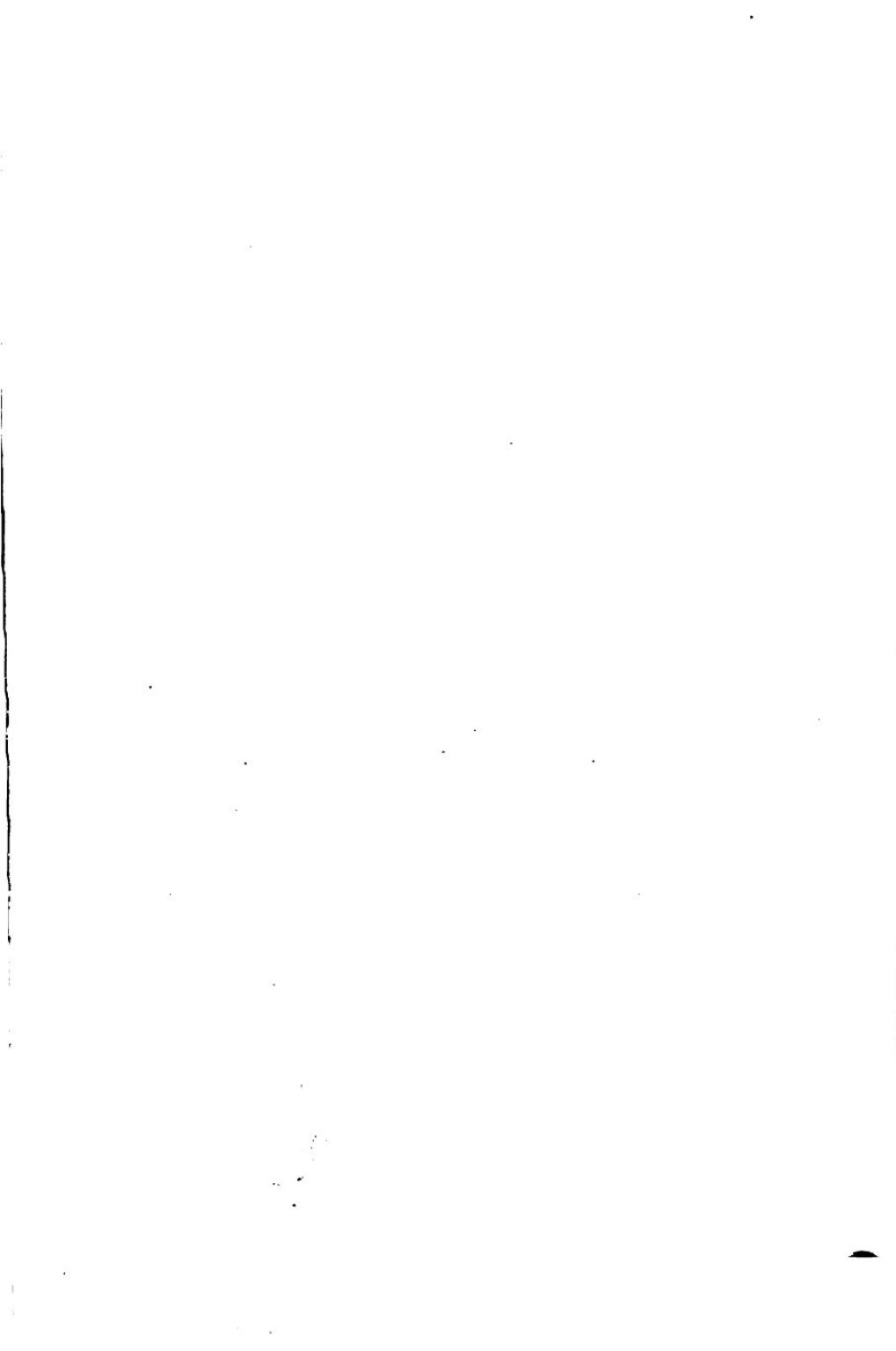
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Elwin R. Sanborn

Courtesy of the
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A QUINTETTE OF MOUSE DESTROYERS



THE IMPORTANCE OF BIRD LIFE

A POPULAR ACCOUNT OF ITS ECONOMIC
SIGNIFICANCE AND CONSERVATION

BY
G. INNESS HARTLEY

ILLUSTRATED



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PREFACE

Coal- and iron-mines are largely responsible for rapid development of the United States. From California, Nevada, Alaska, and elsewhere vast deposits of gold, silver, copper, lead, a multitude of metals, some precious and others base though valuable, have presented enormous wealth to our country. Our great subterranean lakes of oil have made possible the expansion of the gas-engine and the automobile to their present state of efficiency. For centuries the banks of Newfoundland have filled our markets with fish. To the forests of Maine, Michigan, Wisconsin, and Oregon we owe a debt for timber which can never be repaid. From Alaska come sealskins, fertilizer from the phosphatic accumulations of the Carolinas and Florida, wild hay from the prairies, and so on through the mile-long list. The resources of America are immeasurable.

But, while we prick up our ears upon being informed that this fishery produces so many tons of fish worth so much, or that from that oyster-bed may annually be taken ten million oysters, or that so-and-so's manganese-mine accounted for a hundred car-loads of ore last year, we show little

PREFACE

interest when we are told that a sparrow hawk captures ten score field-mice a year and innumerable grasshoppers. Yet those very sparrow hawks save the American farmer considerably more than the combined worth of the fishery, the oyster-bed, and the manganese-mine together.

A large amount of valuable matter has been written on the economic relations of birds to agriculture, their relation to man as game birds, domesticated fowl, producers of guano, ornamental plumage bearers, cage birds, and food. But each of these is a specialized field and has been treated separately as such. One to obtain information concerning the agricultural value of birds is compelled to turn to a treatise on economic ornithology; for their domestication you must pursue a poultry book; other volumes deal with game-birds and game-laws, with cage birds or ornamental plumes.

In the following pages the author has endeavored to discuss the importance of bird life to mankind in all its economic phases. Owing to lack of space, he has not laid particular stress either upon its effect on agriculture or upon the domestication of the fowl. These are admittedly the most important functions of bird life from man's point of view and have been largely dealt with in other volumes. The author contents himself with rather a brief résumé of these functions and passes on to less notable, though highly important, fields.

PREFACE

In collecting material for this volume the author acknowledges special indebtedness for the publications of the State Conservation Commission of New York, the Board of Game Commissioners of the Commonwealth of Pennsylvania, the Department of Agriculture of the Commonwealth of Massachusetts, and the United States Department of Agriculture. He here desires to thank Dr. William T. Hornaday, director of the New York Zoological Park, and Lee S. Crandal, curator of birds at the same institution, for their personal interest and aid in his work.

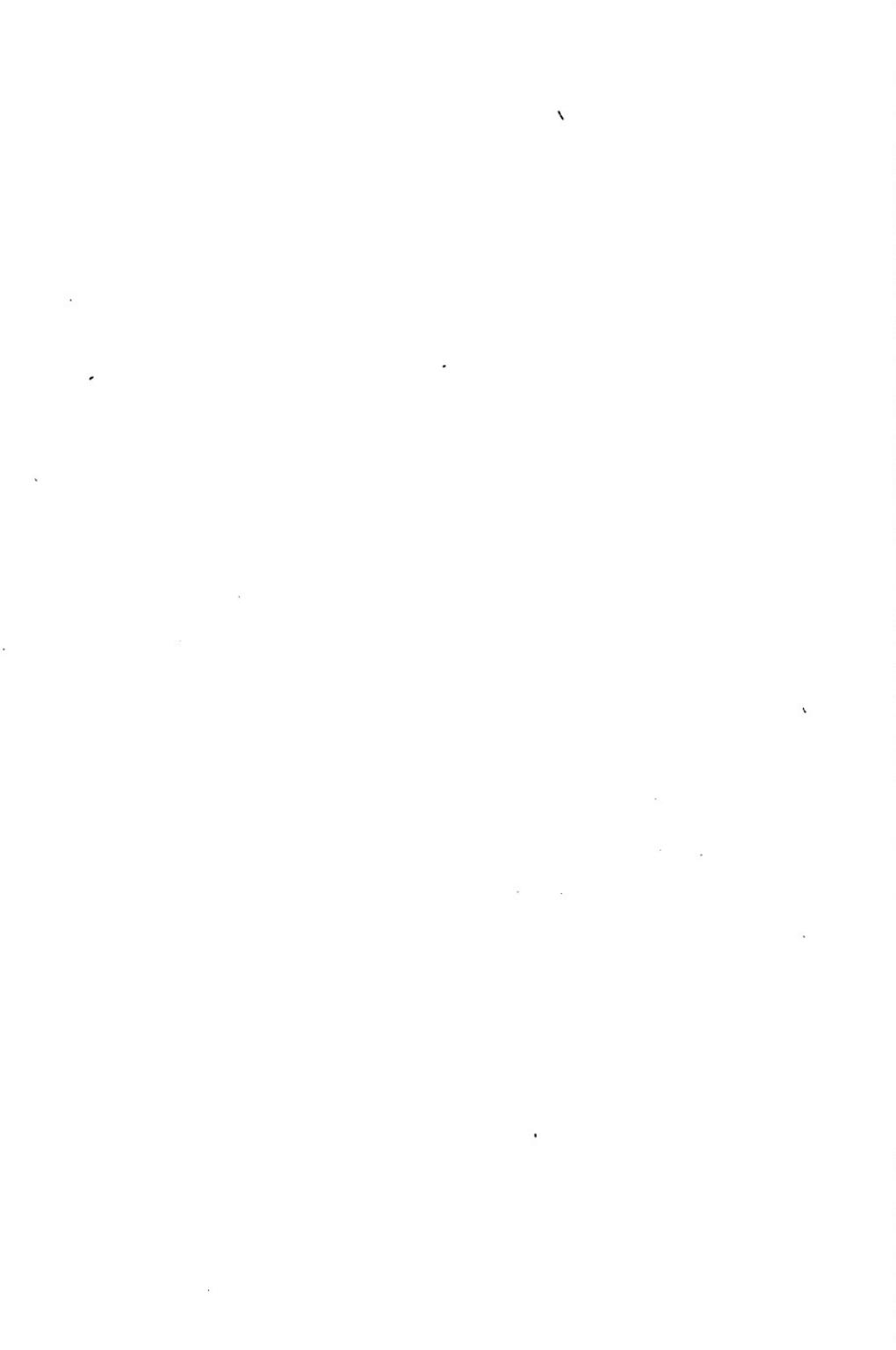
G. INNESS HAETLEY.

Southampton, Long Island, July 1, 1922.



CONTENTS

CHAPTER	PAGE
I THEIR PLACE IN NATURE	3
II THEIR RELATION TO AGRICULTURE	24
III THEIR EFFECT UPON HEALTH AND THE WORKS OF MAN	51
IV DOMESTIC FOWL	59
V DOMESTIC PIGEONS	86
VI BIRDS TRAINED TO HUNT	114
VII BIRDS TRAINED TO PERFORM	134
VIII ORNAMENTAL PLUMES	154
IX FEATHER INDUSTRIES	176
X GUANO	196
XI BIRDS AS FOOD	213
XII GAME-BIRDS	233
XIII GAME-LAWS	259
XIV A CONSERVATION SKETCH	286
APPENDIX	302
INDEX	307



LIST OF ILLUSTRATIONS

A Quintette of Mouse Destroyers	<i>Frontispiece</i> <small>FACING PAGE</small>
A Million Birds on One Island	8
The Rookeries Lie Like Dark Shadows of Immovable Clouds	8
Buff Orpington Cock	72
Buff Orpington Capon	72
The Red Jungle Fowl	72
Silky Bantams	72
A Loft of Homing Pigeons, Showing the Trap Door	104
The Message Is Placed in a Metal Cylinder Fastened to the Leg of the Bird	104
Almost Exterminated for the Plumage Trade . .	168
Bought in London, 1912	176
Victoria Crowned Pigeon, the Bird Which Is Scalped for Its Lacy Plumes	176
Albatrosses of Laysan Island Before the Tragedy	176
1050 Plumes of the Bird of Paradise, Seized by the U. S. Customs Officers	184
A Pair of Nubians	184
Disused Cormorant Nests, Showing Guano Ready for Gathering	224
A Cabot's Tern Colony in Texas	224

LIST OF ILLUSTRATIONS

	FACING PAGE
The Hunt for Down, Plumage and Food Extermi- nated These	232
The Market Hunters Return	248
Wild Ducks Killed Under the Law	278
Canada Goose and Her Brood of Goslings	278
The Result of Conservation	296
View of the Rearing Field on the Virginia State Quail Farm	296
A Flock of Bob-Whites and Their Bantam Mother	296

THE IMPORTANCE OF BIRD LIFE



THE IMPORTANCE OF BIRD LIFE

CHAPTER I

THEIR PLACE IN NATURE

1. Population.
2. Natural Enemies.
3. Destruction of Insects.
4. Effect on Vegetation.
5. Destruction of Vertebrates.
6. Minor Relations.
7. Summary.

1

Population

Quite the most obvious of all the laws of nature is the one that requires all living organisms to consume food in one form or another to enable them to survive and multiply. This food as a general rule consists of other living organisms. Plant life alone is able to obtain sustenance directly from the chemical elements of the soil.

Deer, for instance, relish as food the blades of grass; but the wolf and certain other carnivorous beasts equally relish the flesh of the deer. And it is fortunate for the welfare of the grazing race that this is so. Without a host of deadly enemies,

4 THE IMPORTANCE OF BIRD LIFE

—including disease, climatical alterations, and the elements, as well as living creatures,—deer theoretically would multiply at such a rapid rate that the North American continent would be overrun within a few decades. The soil could not produce sufficient fodder for their needs; the verdure would be grazed to death. As a result, the deer would starve: the species would die out, exterminated by its own prolificacy.

One of the chief instruments chosen by nature to combat this excessive production is the carnivore; and the deer, however paradoxical it may sound, is really saved by its most feared and deadly enemies. The Balance of Nature is maintained, and it is this Balance which permits the world to carry on where otherwise it would choke itself to death.

Like the deer, birds, if permitted to multiply unmolested, would increase at an appalling rate, four or five times faster than the animals. The avian class by so much the sooner would become extinct through overpopulation. Fortunately for the world in general, unless man is the exterminator, such a catastrophe cannot overtake us. The natural enemies of birds are far too numerous to permit of so rapid an expansion.

Despite these enemies, birds survive in untold multitudes. It is due to their superior mode of travel that they are so universally scattered over

the land surfaces of the earth. There exists scarcely a single sea-swept rock, sand spit, or coral key which is not the home of some form of feathered life. The north and south polar regions, during their respective summer seasons, are overrun with countless hordes of geese and penguins. The mountain tops have special species of their own. The Sahara Desert is populated with a few small birds and a multitude of vultures. Even the oceans boast of a winged fauna of albatrosses, phalaropes, gulls, and petrels.

Not only have birds world-wide distribution, but their species are the most numerous of all vertebrated animals. Insects and mollusks, alone of all the animal kingdom, surpass them in this respect. To-day there are known to exist about 19,000 species and subspecies of birds, and numerous newly described forms are annually being added to the list. Against these may be named in the scientific calendar something more than 15,000 species of fish, about 1000 of amphibians, roughly 3500 of reptiles, and of mammals, the class which we commonly associate with the greatest number of forms of all, only 4500!

Of the now existing continents, South America, with its gigantic rain forest, contains the most varied bird fauna. Upward of 5000 racial forms have thus far been described from there, and probably when the entire region has been exploited

6 THE IMPORTANCE OF BIRD LIFE

several thousand more will be added.¹ In North America there are about 1200 forms listed. Europe, Asia, Africa, and Australia are rich in forms, but a combined census—minus a thousand or two island subspecies—shows them to contain altogether scarcely more than the two continents of the Western Hemisphere.

Although fish lead in actual total number, birds make not a bad second when compared with the comparatively meager numerical strength of the remaining vertebrates. We know that seventy years ago hundreds of thousands of bison roamed the plains of the West in herds so vast that they extended beyond the horizon. Within the present generation, even to-day, fifty and seventy thousand caribou may constitute a single herd on the frozen prairies of northern Canada and Alaska. Audubon, however, in 1813, observed a flock of passenger pigeons which took *three days to fly* past a certain point!

There were more than two and a quarter *billion* pigeons in that one drove. "The air was literally filled with Pigeons, the light of noonday was obscured as by an eclipse. . . ." Stefansson, the arctic explorer, tells of Banks Island and neighboring lands several hundred miles north

¹ Racial forms as opposed to species are geographical subdivisions of the latter, generally diverging from the type in color, size, or both. Thus, for example, there are described twenty-two races, or subspecies, of the common song sparrow (*Melospiza m. melodia*), all found in North America.

of the arctic circle as being "white with millions of wavy geese" (perhaps snow-geese) in the breeding season. Good authorities state that nine million penguins inhabit Dassen Island off the Cape of Good Hope; and R. C. Murphy, of the American Museum, speaks of almost a million cormorants living on a tiny island off the coast of Peru. While it is difficult to visualize these millions without seeing them, they nevertheless react as a vivid contrast to the puny thousands of bison and caribou.

Therefore, because of their almost universal distribution and the incalculable numbers in which we find them, it is not at all surprising that birds play a major part in the really small cosmos of our planet. Theirs is a great mission, a mission which is undertaken with the utmost diligence and courage. In a large measure they preserve the Balance of Nature, in that they check the swelling hordes of insects, control the spread of plant life, replant denuded land surfaces, and extirpate or control the small vertebrates that first ravaged the vegetation of the world and then turned their attention to the crops of mankind. They are a powerful factor.

2

Natural Enemies

Among the natural enemies of birds disease probably holds a far more important position than

8 THE IMPORTANCE OF BIRD LIFE

is generally supposed. Social species, those that live in flocks, are particularly subject to its ravages. Thousands of crows die each year in a single roost from the effects of a virulent throat and nostril malady which may possibly wipe out the entire community. There is a "grouse disease" in Great Britain which has accounted for tens of thousands of game-birds. Others are attacked by a form of tuberculosis, and great numbers of sandpipers each spring are left behind on their northerly migration from South America because of diseased sexual organs.

Changes of climate and storms also take an appreciable toll. It has been said by more than one good authority that an icy winter kills more game-birds than all the human hunters combined. This statement, in the present day of millions of eager gunners, perhaps is stretching the actual facts, but there is no reason to doubt that entire coveys of bob-white quail and other gallinaceous fowl are frozen stiff in cold, sleety weather. Land birds driven to sea by storms during their migrations have been known to succumb in thousands. This is one of the causes, though probably not the true one, given for the sudden disappearance of the passenger pigeon. Still other birds, unable to migrate south in the winter because of disease, injury, or old age, starve to death.

Certain species do not leave the temperate climate in which they are born. In the winter



Courtesy of Dr. R. C. Murphy

A MILLION BIRDS ON ONE ISLAND



Courtesy of Dr. R. C. Murphy

THE ROOKERIES LIE LIKE DARK SHADOWS OF IMMOVABLE CLOUDS ON THE SLOPING EXPANSES OF ROCK, WHITENED WITH CHALKY GUANO

SN
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months they become the prey of a host of predatory creatures. When the soil is frozen and the field-mice are safely burrowed in their warm winter nests, then goshawks, Cooper's hawks, sharp-shinned hawks, horned owls, and others descend upon the weaker members of the bird tribe. An occasional rabbit is added to their menu, but game- and song-birds are their choicest morsels. They take a fair toll in the spring and summer months, but alleviate it somewhat with mice and other small rodents.

Hawks and owls are not the only creatures that prey upon the less ferocious species. Keeping them company are the "vermin," individually known are weasels, skunks, lizards, snakes, and the like. A fox seeks out a bird as it would the daintiest titbit. Cats of the tabby variety, which have long forgotten the meaning of a home hearth, utilize them as a staple article of diet. Lizards wax fat on their eggs, as do snakes of many varieties.

Nor are "vermin" and a few species of hawks and owls the only animal enemies of bird kind. To a certain extent the birds war upon themselves. Crows and jays rob a nest of its eggs or young as much to satisfy their marauding instincts as for food, and they are not averse to raiding the home of one of their own species: they do considerable damage. Where there are large colonies of breeding cormorants and other sea-birds,

10 THE IMPORTANCE OF BIRD LIFE

gulls reap a rich harvest of eggs and nestlings. Condors, until driven off by watchmen, created much havoc among the great guano rookeries of Peru. Skuas hold the penguins of anarctic regions in check.

From the foregoing it would seem as if the odds against survival are so overwhelming that birds will soon be but memories of the past. The limiting barrier, however, is not so mighty as it appears. Birds as a whole are extremely prolific. When matured, owing to their power of flight, they are difficult of capture. Finally, they carry on a not ineffective strife with their enemies, inflicting at times as much damage as they receive. Thus, while certain hawks and owls prefer a diet of bird flesh, others, like the red-tailed or so-called "hen-hawk," the American sparrow-hawk, and the majority of owls, subsist mainly on "vermin" in its varying forms. Some kites and another "hen-hawk," the red-shouldered species, delight in the flesh of lizards and snakes. Harmful rodents, such as field-mice and rats, all of which will break into a succulent egg with pleasure, are mainly kept within bounds by the birds.

Being thus able to hold their own, birds play no mean part in the economic relations of mankind by limiting the rodent pests which destroy crops; but this is of comparatively small moment in the broader field of Nature. Birds have a greater

mission: like the weasel and the fox in their own world, they are the spoilers of the insect world.

3

Destruction of Insects

Insects are fair game. Finches and game-birds subsist mainly on seeds—weeds, acorns, or grain, as the case may be; robins and catbirds enjoy a juicy cherry or a luscious strawberry; parrots and toucans consume tropical fruit in enormous quantities; but all of them will swallow an insect with avidity, be they song sparrow, partridge, robin, or toucan. A beetle to a bird is like a drop of nectar to a honey-bee, to be consumed immediately without the loss of a second. Certain species survive wholly upon insects; insects are essential to the diet of most others, particularly in the nesting season when the young are to be fed. Night-hawks, swifts, and swallows live virtually on them alone. Grasshoppers furnish much of the daily fare of turkeys. The American sparrow-hawk prefers a grasshopper above anything else as food. A wood-duck will swim far for the larva of a dragon-fly. A hummingbird devours microscopic insects by the hundred at a meal.

The importance of insect destruction cannot be overestimated when we stop to consider the potential possibilities of the tiny organisms. Let it be understood that there are some four hun-

12 THE IMPORTANCE OF BIRD LIFE

dred thousand species already recognized, and virtually all are capable of multiplying at an appalling rate.

With this great potentiality for reproduction, then, insects cannot be allowed to go unchecked; otherwise within a short time, the surface of the earth would be a wasted desert. Fortunately nature has provided a multitude of enemies, more, indeed, than birds ever dreamed of having. Thus, the mycelium of certain fungi (the thread-like body of the plants) thrives on the bodies of certain insects; diseases blight them; frost and flood cut short their lives; animals, like the ant-eater, make of them a sole source of food; parasites flourish and grow fat upon them; they wage continual war among themselves; and birds destroy them—parasites, predaceous forms, and all.

But while this form of destruction is perhaps the greatest mission of birds in nature, it also is of the highest economic importance to agriculture and will be discussed more at length in the next chapter.

Effect on Vegetation

The next great avian function falls under two apparently opposite heads: the limiting of vegetation and the spreading of vegetation.

Limiting of vegetation is confined to the destruction of fruit and seeds. Birds excel in this. Enormous quantities are annually done away with. Much depends upon the type of fruit, whether its mere digestion will serve to kill the enclosed seed, or whether the seed will pass unscathed through the intestines and emerge ready to germinate. If the fruit happens to be unripe the seed naturally seldom survives. Although birds each year consume millions of tons, they do not succeed in rendering all the seeds sterile. A large proportion, especially seeds of berries, live to germinate after they have been evacuated. On the other hand, a great number of weed seeds are destroyed.

It has been determined by experiment that the vegetarians among birds fall into three natural groups. The first is made up of those species which grind and break up the hardest fruits and seeds in their gizzards by the aid of pebbles and gritty sand. Among these are the gallinaceous fowl (e. g., turkeys, grouse, quail, and domestic fowl), pigeons, ducks, titmice, sparrows, and most finches. The smaller birds crush the seeds in their bills before swallowing.

The next group is partly composed of crows, ravens, jackdaws, and jays. Hard-coated berry seeds and cherry-pits pass uninjured through their intestines or may be evicted through the

14 THE IMPORTANCE OF BIRD LIFE

mouth, but soft-skinned seeds are utterly destroyed.

Thrushes form the third group. These do not retain the seeds for long after swallowing the fruit containing them. As quickly as the pulp is disposed of, the seeds are rejected through the mouth before they can pass from the crop to the gizzard. The small seeds, however, travel through the intestines, with the result that about 80 per cent. are afterward capable of germination. Likewise all hard seeds which pass through members of the second group germinate, but none from the first group. The finches in the United States daily destroy sufficient weed seeds to earn for them the eternal gratitude of the country.

But in the same way, while the finches are destroying their daily millions, more millions are being scattered broadcast by the other groups, to take the place of plants which have succumbed to time or malnutrition. This brings us to birds in their character of planters.

Four-footed animals, the nut-storing squirrels and berry-eating bears for example, play an active part in the spread of plant life, but birds by all odds are primary factors. Crows, jays, and woodpeckers are responsible for far more dispersal of seeds than they are commonly given credit for. They store great heaps of nuts like squirrels; they hide them singly in crev-

ices of the bark, or collectively under logs; or they drop them miles from the parent tree. The nuts sprout, take root, and perhaps mature in a spot where wooded plants never grew before.

It is not rare to notice an old disused field, forsaken by the farmer because of its barrenness, covered with a scattering of young oaks, hickories, sycamores, and the like. Each year adds to its new flora. Field-mice and other small rodents are responsible for some of this, and the wind has played its part; but birds have been the chief conductors. To them are due the blackberries, the strawberries, and the trailing dewberries. The wind brought the sycamores, the willows, and the maples, but the acorns of the oaks were transported by the birds.

Although, as has been stated, a certain number of seeds are expelled from the mouth, the generality pass through the intestines before evacuation. Seeds may thus be distributed abroad as the bird flies, or when it perches. The presence of a large number of hedge-rows is due to the latter event. The American farmer does not make a common practice of planting hedges between fields. He is constrained to erect a fence, post and rail, stone, or wire, as he sees fit or the resources of the locality allow. His live stock have to be kept within bounds; a hedge is ineffective for this purpose.

Unless, however, the farmer maintains a con-

16 THE IMPORTANCE OF BIRD LIFE

tinual guard with brier hook and scythe, a hedge invariably does spring into being along the fence line. Almost before he realizes it, there will arise a well defined row of junipers, chokecherries, sassafras, a conglomeration of a dozen species perhaps, and banked by dense growth of blackberries, wild raspberries, or sumacs. As none of these spring from wind-blown seeds, birds must be the carrying agents, or, if it be a stone fence, chipmunks, perhaps, and birds.

Again, certain plants owe their very existence to the agency of birds. To the fruit-pigeons is attributed the spread of wild nutmegs over New Guinea and the surrounding islands. The pigeons swallow the fruit for the sake of the red "mace" which covers the seed, and later throw out the hard pellet through the mouth as robins do cherry-pits, or expel it with their feces.

A more striking example of entire dependence is the case of the mistletoe. Living only as a parasite on trees, the seed must be deposited in a crevice of bark before the plant can develop. The white viscous berries are eaten only by birds, who later evacuate the seeds freed of pulp. If this occurs while the bird is perched in a tree, the excrement runs down over the branch and the seeds find a lodgment for later germination.

Further distribution of plant life may occur from the mud which sometimes adheres to the feet. Such an eventuality is particularly prevalent

among species like the woodcock and marsh birds which live in muddy areas. Darwin was able to rear eighty-two plants from a single ball of earth adhering to the foot of a partridge. The roughened shank of the large tinamou of South America carries an appreciable amount of earthy material lodged in the crevices of its rear scales. This forest mold ordinarily contains seeds.

Birds are beneficial to vegetation in other ways. The hummingbird, for instance, aids in the cross-pollination of blossoms by carrying pollen in its feathers from one flower to another. This holds true for other species, but as the work would be carried on by insects if birds were not present their efforts cannot be assumed to play an essential part in cross-pollination. On the other hand, ripened seeds like beggar's-lice and cockles are specially constructed to adhere to feathers and fur, and may be carried a long distance before their hosts can free themselves.

Once more, considerable dispersal of vegetation is due to birds of prey. The osprey when it plunges after carp or perch often clutches a talonful of water-weeds as well as its intended quarry. These are sometimes transported to a tree that overhangs another body of water. There, while the osprey consumes its catch, the weeds drop down into the new water. At the same time the contents of the fish's stomach drip into the lake, carrying great numbers of minute

18 THE IMPORTANCE OF BIRD LIFE

aquatic plants and often seeds. Similarly, when a Cooper's hawk devours a granivorous bird, the material in the crop of the victim is scattered upon the ground, or is expelled later in the feces of its slayer.

5

Destruction of Vertebrates

Having touched slightly upon insects and discussed the subject of limitation of vegetation, we now arrive at the third mission in which birds hold a trump card. This is the suppression of vertebrates.

Although the destruction of rodents properly falls in the field of economics and will be discussed at greater length in the next chapter, birds have an effect on other vertebrates which warrants a place here. Large hawks, eagles, and owls exert considerable influence over the home life of many medium-sized animals. The hawk-eagles of South America subsist almost wholly upon monkeys and other mammals that inhabit the roof of the jungle. In other parts of the world eagles capture fawn, young antelope, sheep, goats, and even young wild pigs. Nor are reptiles exempt. The secretary-bird of South Africa is closely protected by law because of its fondness for poisonous snakes. In our country,

besides several hawks that prey upon snakes and lizards, the turkey-vulture exhibits a fondness for the eggs of alligators, a habit which serves in some measure to hold those reptiles within proper bounds.

Sea-birds are harbingers of destruction to the fish group. Most of them live entirely upon fish. Gulls, albatrosses, and fliers of that type annually devour millions of tons. Other than these, there exist numerous colonies of fish-eating cormorants, boobies, and pelicans, to say nothing of penguins, auks, and sea-ducks. A single colony sometimes consists of hundreds of thousands of individuals, even of millions. So plentiful are the cormorants and other water-fowl of the St. Lawrence Gulf that they darken the face of cliffs already whitened with their excreta. And the St. Lawrence is only one of many similarly infested regions of the earth.

Parts of the antarctic continent form another area with its millions, as do the coasts of Alaska, Labrador, and Peru, and every one of the aquatic birds that live there is a fish-eater. Allowing one pound of fish a day to a cormorant,—a low estimate,—we can reckon that a small colony of 100,000 birds will consume fifty tons, or virtually two full carloads, every twenty-four hours. With the million upon million individuals of this single family in existence, and other millions of their

20 THE IMPORTANCE OF BIRD LIFE

kindred with even more voracious appetites, it is evident that their combined daily toll is enormous.

When compared to that of aquatic birds, the damage done to the fish tribe by such species as the osprey and the kingfisher is slight. It is appreciable, however, when we remember that they confine their operations to small bodies of water which of necessity must have a limited aquatic population. Thus, kingfishers carry havoc among the minnows and small fry of lesser waterways and ponds, and therefore no longer receive protection from the law. But, despite their depredations, their part in the great balance is as much to spread life as to curtail it. Barren pools are stocked with fish by kingfishers. Although a fish normally will seldom escape an osprey when once gripped in its talons, under sudden stress the hawk will drop it; if, for instance, he is beset by a swarm of crows or martins, he may be forced to drop his load in order by flight to save himself from persecution. Many isolated ponds and lakes have been stocked by the agency of these birds.

6

Minor Relations

Although disease sometimes sweeps through a colony of birds, exterminating it to the last

member, it is doubtful if they can communicate the disease to another species. Evidence on this score is meager and wholly unconvincing. It is possible, however, for them to carry the germs of a disease, with which they are not themselves impregnated, from one animal to another. The most outstanding case of this kind is that of the turkey-vulture and the pig. The vulture is a scavenger, pure and simple, and feeds wherever it can find carrion. To one of these birds a pig which has recently succumbed to cholera is as succulent a morsel as one which has died of old age. The vulture can see no difference. Consequently, upon leaving the skeleton, it carries off upon its body and feathers a multitude of deadly germs.

The result is easy to follow. Upon alighting in a piggery, perhaps miles distant from its recent activities, the vulture unwittingly scatters the germs broadcast, either through excretion or by coming into contact with an object to which they will adhere. If pigs are present they will become inoculated. The remedy of course lies with the farmer; he should bury his dead stock.

It has more than once been claimed that birds are partly responsible for the spread of the chestnut blight which of recent years has devastated the chestnut forests of the United States. This is not at all improbable. The blight is a fungus disease which works on the inner, or cam-

22 THE IMPORTANCE OF BIRD LIFE

bium, layer of bark. The spores are exceedingly minute and may be wafted long distances by the wind. Great numbers may also be transported from grove to grove and forest to forest hidden in the feathers of birds, just as the humming-bird carries pollen.

Among other minor relationships which may have a bearing on the general balance is the continual association of some species with large four-footed beasts. For example, we have in America the cowbird which has contracted a habit of following a herd of cattle about a pasture to feed upon the flies attracted by the animals. The cowbird, however, seldom or never alights upon the cattle themselves as does that strange black cuckoo of South America, the ani, and the starling-like rhinoceros-bird of Africa.

These have an especial fondness for ticks and other body parasites which abound on all beasts free from the curry-comb, and they take a small but valuable part in the life history of the animals they attend. Unfortunately, the rhinoceros-bird, with the coming of domestic cattle into South Africa, has fallen into disgrace. In tearing a tick from its hold on the back of its host, the bird generally causes a small wound in the tender hide, which soon grows infected. The rhinoceros-bird of late years has also become endowed with a taste for blood, and now inflicts wounds where there are no ticks at all.

Summary

To summarize briefly: The greatest function of birds in nature is the utilization of their vast numbers to aid in the maintenance of the great Balance. Their chief mission is to check the spread of insects. They help to hold within bounds the spread of vegetation and at the same time oversee the establishment of plant life in localities where it has been uprooted or is absent. Through their efforts the enormous shoals of fish are limited, and barren pools are stocked. They reduce the number of crop-destroying rodents. They act as food for the support and growth of other animals.

In other words, birds are efficient policemen, successful executioners, careful husbandmen, and faithful martyrs to their cause. They are efficacious guards of the Balance of Nature; and their work is well done.

CHAPTER II

THEIR RELATION TO AGRICULTURE

1. General.
2. Harmful Insects.
3. Destruction of Insects by birds.
4. Consumption of Seeds.
5. Effect on Rodents.
6. Destruction of Fruit and Grain.
7. The Kea Parrot.
8. The Cash Value of Birds.

1

General

When man first scratched the soil with a pointed stick and deposited in the furrow thus formed a seed of wild grain, he unwittingly was embarked upon an enterprise contrary to the set rules of Nature. By planting and cultivating crops where Nature had not intended them to grow, he had created a disorder in her narrow pathways. The natural conditions of law and order were knocked topsy-turvy. No time was allowed in which to build up a bulwark of protection for the new creations—grain, fruit, and vegetables contrived from artificial selection; it all happened too suddenly. Insects, weeds, beasts, fungi, and mildew diseases, finding a fresh outlet for expansion, seized these unnatural plants to

breed upon and grow strong. The great Balance of Nature was upset.

Only one course remained for Nature to pursue at this crisis. Her policemen, the birds, were hurried to the rescue. They alone formed a living barrier through which the unruly ones would find it difficult to drive.

Unfortunately it took men several thousand years to learn that birds were their friends and helpers. During all that period birds were considered detrimental in every way to the best interests of husbandry. Birds stole grain, they robbed the poultry yard, they consumed fruit, and they destroyed the shoots of young plants; they were bad through and through. Of so much man assured himself as an eye-witness, and he did not think to look further.

At last came a day when the study of natural history was accorded a place among the sciences. People began to specialize in ornithology. To their amazement, they discovered that all birds were not so black as they had been painted. Indeed, from the analysis of the stomach contents of thousands of individuals, it was found that scarcely any of them were bad. Men learned that for every fowl the so-called hen-hawks captured, most of them devoured a hundred or more rats and field-mice. It came to be understood that the destruction caused by those rodents far exceeded the money value of a few fowls. The bal-

26 THE IMPORTANCE OF BIRD LIFE

ance stood well in favor of the hawks. Again, it developed that many of the supposedly most voracious grain-eating birds were in reality destroyers of the insects so detrimental to the rearing of crops. It was proved that other birds accounted for thousands of tons of weed seeds which otherwise would choke the truck gardens. Finally, by compilation of statistics, it was shown that they are responsible for the saving each year of billions of dollars to the world of agriculture.

The husbandman does well, then, to hesitate before consigning all the birds on his farm to perdition. He now realizes their true worth and knows that their beneficial functions far outweigh their evil ones. In the eyes of the modern farmer, their minor depredations assume a negligible position wholly discounted in the cause of the greater good. So firmly established are their useful characteristics in his mind that agricultural schools all over the world are now laying particular stress on the study of economic ornithology. He denominates these characteristics under three chief heads: the destruction of insects, of weeds, and of rodents.

Harmful Insects

Insects are responsible for more damage to farm crops than any other known organisms of

the animal kingdom. To them is due a considerable amount of disease among domesticated animals. Their rate of reproduction is appalling. Their numbers amount to a figure too enormous for the human mind to grasp. Their appetite is tremendous; in proportion to his size a man to keep on an even basis with some of them would have to consume tons of food at a meal. The flesh-eating larvæ of some flies will devour a hundred times their own weight of meat in twenty-four hours, and a caterpillar in a day will consume a leaf weighing ten times itself. Therefore, insects, unhampered and unhindered, are a serious menace to agriculture in all its forms.

Fortunately, as outlined in the previous chapter, the insects are circumscribed on all sides by limiting factors which serve to maintain their population within moderate bounds. The world is at odds with them in order to keep the Balance, which the coming of cultivation so nearly upset.

As the agricultural expert has learned to know insects, he separates them into three groups, vegetable-eaters, predaceous forms, and species parasitical to his live stock. The last group are controlled by washing and spraying the domesticated animals, but the others survive artificial methods of getting rid of them by poison.

The vegetable-eaters, as their name implies, include all the species whose food consists of vegetable matter. These are responsible among

28 THE IMPORTANCE OF BIRD LIFE

other things for the destruction of grain, forage crops, foliage, fruit, and the produce of the truck garden. They constitute by far the greater portion of the class of insects, and are the chief pests upon ~~which~~ the farmer vents his ire. They include the caterpillars, locusts (grasshoppers), crickets, army-worms, rose-beetles, cicadas (commonly called locusts), cotton boll-weevils, other weevils, stink-bugs, plant-lice, and a myriad more. These are utterly harmful to agriculture.

Maintaining a continual warfare upon the vegetable-eaters are the second group, the predatory species of the insect world. Although predaceous in fact, all do not live directly by capturing their enemies. Many, however, may be likened to carnivorous animals. In their small way the ground-beetles, robber-flies, certain bees, numerous spiders, mantis insects, and the like are utterly as savage as the lions and tigers of the mammal world. They stalk their prey, spring upon it, and rend it to pieces as ferociously as any wolf or grizzly bear.

Far more efficacious in their methods of destruction are the parasitical insects. They are gifted with the means of depositing eggs beneath the tough skins of their victims. When the eggs hatch, the larvæ feed upon the flesh of their unfortunate host until the latter is so weakened that it dies. Their work is more subtle than the impetuous assaults of their more savage brethren.

ren, and it sometimes leads to the total subjection of an economically harmful species of vegetable-eaters.

An excellent example of this means of limitation is to be found in the case of the common cabbage-butterfly. The crafty executioner is a tiny, almost microscopic, ichneumon-fly which, for lack of a common English name, must be known by its generic title, *Microgaster*. This insect hovers about in the air until it perceives a cabbage-caterpillar at work upon a leaf. Down it swoops, and the long ovipositor enters the body of the unsuspecting victim. A considerable number of eggs are ejected from the ovipositor into the body of the caterpillar, and the little ichneumon-fly departs, satisfied that its chief mission in life has been accomplished.

Before long the eggs hatch and the larvæ of *Microgaster*, minute grub-like organisms, begin to feast on the fatty layer beneath the skin. Undismayed, the caterpillar continues to demolish the cabbage, while the larvæ grow. The day finally arrives for the caterpillar to pupate, to form its chrysalis. It grows sluggish of movement in preparation for the event to come.

But, unfortunately for their host, the ichneumon larvæ feel that they, too, must pupate. The space is too small within the caterpillar to permit the spinning of cocoons, so without ado they eat their way through the skin to the open air, leaving

30 THE IMPORTANCE OF BIRD LIFE

their host to die. Mother *Microgaster* did her duty well. Not 2 per cent. of the cabbage-caterpillars escape her inoculation.

One might think from the above that the parasitical and predaceous forms alone could cope with the injurious insects, that the additional drafting of birds for the fray is unnecessary. Such would be the case but for two reasons. Insects multiply at an enormous rate, and the predatory species are greatly inferior in number to the crop-damaging kinds. Just as hawks alone are unable to check the spread of birds, so are insects incapable of holding their kindred within bounds.

When one stops to consider the terrible insect scourges which from time to time have blighted large areas of the earth, he will realize that Nature is not as perfect a guardian as she might be. Many of her laws do not work at all where man's handiwork is concerned. So slow is she at evolving new creations that there apparently has not been sufficient time to produce a formidable antagonist to the spread of locusts and army-worms. These insects possibly were active cogs in the machinery for limiting the growth of vegetation before the coming of cultivation, but now they are wholly detrimental to all forms of agriculture.

It is a matter of historical fact that locust plagues invariably are accompanied by a swarm of birds. Species whose natural food is quite

different from grasshoppers will congregate by the hundred and gorge themselves until scarcely capable of flight when those insects appear. Herons forsake their marshes, vultures their carrion, seed-eaters their seeds, and ducks their wild celery, when an extraordinary host of grasshoppers is sighted. Such an event has happened not once but a score of times in the history of the United States; it is common in Africa and other locust-infested lands. The reports of the State departments of agriculture are replete with such instances.

About fifty years ago the settlers near Great Salt Lake were reduced to starvation rations through the destruction of their freshly planted crops by swarms of grasshoppers. Then came the gulls. True to their instinct, they gathered from the lake in thousands, and before many days had passed the locusts were no more; all had been devoured. There stands to-day in Salt Lake City a beautiful monument erected in honor of those gulls.

The destruction, however, of suddenly arising insect swarms, though important, is not the chief function of birds in the sphere of agricultural economy. Their mission is to exert a steady pressure on insects as a whole, to act as "moppers up" for the predaceous species, and at the same time to keep the latter from spreading beyond control.

32 THE IMPORTANCE OF BIRD LIFE

3

Destruction of Insects by Birds

In the instinctive efforts of birds to maintain the balance of agriculture, they devour many useful species of insects. Their instinct is to fill their crops with food. A robin cannot be expected to distinguish between economically desirable beetles and bad ones. A "good" robber-fly and a "bad" house-fly probably taste much alike to a kingbird. A night-hawk would rather swallow a tiny *Microgaster* than a June-bug. They consume all species, beneficial and harmful alike.

An examination, however, of numerous bird stomachs has shown that the larger proportion of insects taken is made up of vegetable-eaters. This is not surprising when we stop to consider that the vegetable-eaters far outnumber the other forms in nature. Both are destroyed in proportion to their numbers.

It so happens that, as in the case of the cabbage-caterpillar, the vegetable-eater is not destroyed by parasites until great damage to crops has been accomplished. The second generation, it is true, is reduced in numbers, but not before the first generation has inflicted serious loss upon the farmer. Birds, therefore, by consuming the caterpillar, though with it a number of parasitical larvæ may be destroyed, are

saving the farmer from a direct money loss.

As a matter of fact the agriculturalist is more indebted to birds for the preservation of his growing crops than to any other living creatures. In the predatory insects he finds true helpmates who destroy much of the smaller fry; but the rapacious caterpillars, cicadas, and grasshoppers are too large for them to attack. Parasites deal with these forms, but their action is slow and affects the immediate crop little.

Virtually all birds will gobble a large insect upon sight. Entire colonies of tent-caterpillars are destroyed before they can denude a tree of its foliage. Broods of "seventeen-year locusts" (cicadas) are suppressed by English sparrows, which seem to have a strange fondness for those queer insects. Chickadees, kinglets, and nut-hatches rid our orchards of countless myriads of plant-lice and their eggs. One chickadee alone will consume 5000 eggs of the canker-worm moth in a day. A single covey of quail can clear an acre of potato-vines of their beetles.

A few years ago the United States Department of Agriculture set aside a tract of land in Maryland with the view of determining the exact status of birds on a farm. It was necessary, in order to get at their stomach contents, to shoot a great number of individuals. In all, 645 birds were killed during the experiment. The results proved interesting. Virtually all the birds, at one

34 THE IMPORTANCE OF BIRD LIFE

time of year or other, included insects as a part of their menu. Twenty-four species fed on grasshoppers, twenty-one took leaf-mining beetles, thirty-nine consumed ants, and forty-four had eaten weevils. Most birds took two, three, or all the forms of insects mentioned. About one third of all the food consumed by the 645 consisted of insects, 27 per cent. of which were harmful to crops and less than 4 per cent. beneficial. These were the average birds—robins, catbirds, swallows, woodpeckers, kingbirds, crows, and the like—that are found on any typical farm of the eastern United States.

4

Consumption of Seeds

It will not be necessary to enlarge greatly upon the destruction of weeds by birds, as that has been discussed in the previous chapter. To give some idea, however, of the capacity of individuals in that direction, the number of seeds estimated to be eaten by a single bob-white is here set down:¹

Barn-yard grass	2,500
Beggar-ticks	1,400
Black mustard	2,500
Burdock	600

¹ Mrs. Margaret Morse Nice in "Journal of Economic Entomology"; Vol. III, No. 3.

Crab-grass	2,000
Curled dock	4,175
Dodder	1,560
Evening primrose	10,000
Lamb's quarter	15,000
Milkweed	770
Peppergrass	2,400
Pigweed	12,000
Plantain	12,500
Rabbit-foot clover	30,000
Round-headed bush clover	1,800
Smartweed	2,250
White vervain	18,750
Water smartweed	2,000

In addition to this enormous capacity for seeds, the bob-white accounts for 145 species of insects. It is calculated that quail consume 1341 tons of weed seeds in North Carolina and Virginia between September 1 and April 30. The mourning dove is accredited with 7000 seeds daily. The work of finches is highly beneficial, that of the winter birds being particularly so.

On the Maryland farm above mentioned Dr. Judd found that slightly more than a quarter of the birds killed ate weed seeds. Seeds formed about one fifth of all the food consumed by birds on the farm, and, in the case of some individuals, formed from 50 to 70 per cent. of their food. The number destroyed to the acre in twenty-four

36 THE IMPORTANCE OF BIRD LIFE

hours was 46,000, or slightly more than one seed to the square foot. Therefore, the grand total of weeds eliminated in a year from any one farm must be very great.

5

Effect on Rodents

We now reach the third province of birds in the cause of agriculture. This is their destruction of injurious rodents.

It is not commonly realized what a wide-spread menace these little animals are. Collectively they make an enormous group, comprised of squirrels, gophers, lemmings, wood-mice, field-mice, rats, and many others. Their chief food is roots or green crops, and they are ultra-prolific. All people are familiar with the procreant multiplication of the common house-mouse, and field rodents are fully as productive.

Their prolificness at times is amazing. During ordinary seasons they merely seem to hold their own in numbers against natural enemies—birds, cats, and small vermin. Even in these days of “peace” their reproduction is great, but not sufficient to attract their enemies in greater force. The presence of fifty or a hundred field-mice on an acre of alfalfa does not affect the crop, and makes merely fair hunting for vermin. Pres-

ently, however, a period arrives when the rodents seem to multiply as if by magic. One litter after another is born, and within a few weeks these litters produce new litters. Perhaps birds and vermin have withdrawn from the neighborhood, attracted to another locality by an abundance of food, and the rodents are free to breed unmolested. Then, without warning, they sweep in countless hordes broadcast over the land.

In this way the lemmings appear every few years in Norway and Sweden. They sweep in incalculable thousands slowly across the country, devouring all vegetation that stands in their path and leaving a brown, barren stretch behind. They pause for nothing, swim broad rivers and lakes, climb mountains, cross prairies, and finally plunge into the ocean. At their first appearance hosts of predatory animals gather. Foxes, wolves, small vermin, and birds of every description assemble on the trail of the lemmings and fight the retreating horde until it is swallowed by the sea. Even cattle and horses trample the rodent army under foot when it attempts to cross their pasture. Nature orders all her living forces to prey upon the insurgents.

The history of Great Britain is filled with mentionings of "plagues of mice" which from time to time have arisen to destroy the meadows and the root-crops. And her history also is replete with

38 THE IMPORTANCE OF BIRD LIFE

references to the descent of hawks and owls upon the ravaging swarms of rodents and the annihilation of them.

Similar irruptions have taken place in the United States. In Humboldt Valley, Nevada, a most notable one broke out in 1907 and lasted for nearly a year. Hundreds of acres of alfalfa were ruined, and a quarter of a million dollars' damage was done. From eight to twelve thousand field-mice an acre were estimated as gnawing at the roots. Although at that time large numbers of hawks and owls were being shot throughout the country and the population of the various species had greatly diminished, about two thousand managed to gather in the infected region. They consumed millions of mice. Finally, because there were not enough birds to do the work, the farmers were compelled to fall back on poisons to stamp out the pests.

This "plague" happened only fifteen years ago, but even at that late date the farmers of Humboldt Valley did not realize what the birds of prey were accomplishing for them. Although each bird devoured about 700 mice a month, a number of hawks were shot in that very valley that year.

The Department of Agriculture at Washington has studied for more than half a century our native raptorial birds (hawks and owls) to determine which species are harmful to the work of

man and which are beneficial. The contents of about 50,000 stomachs taken from the seventy-five species and subspecies which occur north of the Mexican line have been analyzed. The results show that out of the seventy-five only *six* forms—the goshawk, duck-hawk, pigeon-hawk, Cooper's hawk, sharp-shinned hawk, and the horned owl—are wholly detrimental to the interests of agriculture; beneficial birds form the greater part of their diet.

It is no longer the fashion to call the red-tailed and red-shouldered hawks poultry thieves. They are now recognized, like the sparrow-hawk, as birds to be courted, not killed. Poultry make up but 1 per cent. of the food of a red-shouldered hawk and ten for the red-tailed species. The screech-owl, barn-owl, and long- and short-eared owls, are given every inducement to remain in the neighborhood of farms. The American sparrow-hawk devours hundreds of insects and field-mice to every song-bird it takes. For each bird of economic value consumed, the owls, with the sole exception of the great-horned variety, destroy an average of 400 small rodents; two or three are devoured at a meal. Quite different are these records from that of the sharp-shinned hawk, which lives on a diet 98 per cent. bird.

With a multitude of similar facts before us it is no longer possible to condemn the hawk and owl families. All laws should be repealed relating to

40 THE IMPORTANCE OF BIRD LIFE

the killing of these birds, except the incorrigible six, and any other individual caught red-handed in the act of stealing poultry or game. A few States have already put some birds of prey upon the protected list, and the next decade probably will see the entire Union falling in line. The bounty system of paying for the killing of hawks has virtually everywhere been discontinued. The country has thus been saved millions of dollars both in bounties and in crops. The people are no longer willing to pay cash for what really amounts to increased destruction of their own farm products. They have learned through observation, research, and experience that a reduction in the number of raptorial birds is invariably accompanied by a wave of noxious rodents.

6

Destruction of Fruit and Grain

Now to the shady side of birds in their effect upon agriculture. Many persons have awakened on a June morning to find their pet cherry-tree stripped clean of its fruit; perhaps they have not yet even tasted a cherry of the year. Some have suffered the loss of a fine crop of strawberries; others have entered the garden to pick raspberries and found to their chagrin that there were none. They have every right to feel injured, robbed.

There can be no doubt concerning the identity of the thieves; our own eyes have seen them at work. The culprits are birds, the songsters of our lawns —robins, catbirds, brown-thashers, and others. They are the robbers and should be made to suffer for their misdeeds.

It is doubtful if the indignant possessor of a black oxheart cherry-tree which recently has been ravaged by robins pauses to deliberate upon the general economic value of the bird he is about to destroy. The shooting of the thief affords him pleasure, and no wonder: during the cherry season the food of the robin is 44 per cent. cherry! Even if the man knew that at other times of the year the diet of the bird is 95 per cent. insectivorous, the thought would not deter him from trying to save his fruit.

To people who grow cherries and strawberries on a large scale the incursions of fruit-eating birds entail the loss of considerable sums of money. These men, under specially issued permits, are therefore lawfully allowed to protect their crops with guns, but only during the ripening period of the fruit. Some growers surround their orchards with trees bearing fruit of a poorer grade, but of which the birds are extremely fond, and thus are able to save their pocket-books without resorting to lethal weapons. Many strawberry-producers philosophically increase their acreage of berries in

42 THE IMPORTANCE OF BIRD LIFE

order that both men and birds may have sufficient. These precautions involve both time and money and must be charged up against the birds.

The controversy between poultry-raisers and birds of prey has already been dealt with. The honors are all with the hawks. Growers of grain, however, have a better case, though not so well proved as the case of the fruit men. There can be no denying that birds destroy a certain amount of grain.

It is a mistaken idea, though a widely prevalent one, that grain-eating birds always remain grain-eaters, that the main food of crows, blackbirds, and doves is wheat or oats. Nothing could be further from the truth.

Blackbirds, however, do sometimes eat freshly planted or ripening grain. It is true that crows consume thousands of bushels of unhusked corn in the South each winter when it has been left in the field by farmers who have not the time or inclination to husk it. Bobolinks as rice-birds annually destroy about two million dollars' worth of cereals in the South. And grain makes up about 85 per cent. of the food of the English sparrow.

But, with the exception of one or two of the above mentioned species, the birds have other economic functions which more than counterbalance their depredations. Only thirty-eight individuals out of the 645 collected on the famous Maryland farm had taken grain, and grain made

only $1\frac{1}{4}$ per cent. of the total food consumed. Let us therefore examine more closely into the daily life of some of these so-called noxious creatures.

Every one has seen blackbirds descend upon wheat-fields in flocks of thousands. The question is: How much grain do they destroy? The natural food of blackbirds, as has been proved by investigation, is mainly insects. Naturally, upon alighting in a field they will consume all they can find before attacking the crop. For every bushel of wheat they consume, the farmer can feel assured that they have accounted for five bushels of insects. If left alone to feed and propagate, those insects within the next year would have destroyed at least ten bushels of grain.

Among the several species of blackbirds, some are more enamoured with grain than others. The grackles fall in this latter class, whereas the cowbird and red-winged blackbirds are almost completely insectivorous. The scientific farmer is now versed in the idiosyncrasies of the different forms and, as a rule, confines his attention to eradicating the grackles. Even with the grackles, however, the greater part of their food is insect. It is a historical fact that in 1749 in the American colonies, after a wholesale destruction of crows and grackles for a bounty of threepence a dozen, the northernmost colonies had a season of

44 THE IMPORTANCE OF BIRD LIFE

complete loss of hay and grain. Hay had to be imported from England.

It is also true that the heaviest losses from ravages by the Rocky Mountain locusts have been coincident with or following directly after the destruction of thousands of red-winged blackbirds, grackles, and others. About thirty thousand birds were slain in North Dakota in one autumn by consuming corn soaked in strychnine. It is estimated that these blackbirds would have devoured several car-loads of insects in a month —far more than the bulk of grain they could possibly have destroyed.

Bobolinks belong to the group of blackbirds. Although responsible for an appreciable amount of damage in the winter-time to Southern crops, their warfare against the insects in the summer months is of great monetary value to the country as a whole. The Department of Agriculture is thoroughly cognizant of this fact, and bobolinks have been placed on the insectivorous migratory bird list for protection by Federal law. There is a proviso, however, which permits their destruction in several States, if discovered attacking grain. This enables the Southern farmer to protect his cereals; at the same time it prevents further sale of the "reed-birds" which once so cluttered our markets, and the species is no longer threatened with extinction.

That "feathered pirate," the crow, is not so

evil as he is sometimes said to be. He is, however, an admitted devourer of corn and in the spring has a suspicious fondness for sprouting grain. On the other hand, the crow is in part an insectivorous bird, and the values of insects and grain consumed very nearly counterbalanced each other. But, added to his predilection for grain, he is a thief, a destroyer of bird-nests, and an eater of eggs. To offset these crimes he is a scavenger. It is to be feared that the scales of justice weigh unfavorably against him.

In days gone by great damage was inflicted upon grain-fields by the passenger pigeon. Both in the spring and at harvest time great flocks of these birds would descend upon the fields. So incalculable were their numbers that, though each individual might pick up only a few grains, the total amount consumed was enormous. The passenger pigeon has now disappeared, ruthlessly exterminated, and in the East and Middle West a sparse scattering of mourning doves remains in its place. What grain they pick up is waste material, gleanings from the harvest. They are weed-eaters, not destroyers of grain; decidedly they are a beneficial species.

The same cannot be said of the English sparrow. It is a bird that does not belong, a stranger within our territory, an inveterate consumer of small grain. Unlike the majority of finches and sparrows it has no real liking for

46 THE IMPORTANCE OF BIRD LIFE

weed seeds. Although it has a particular fondness for cicadas and a few other insects, its usefulness to mankind stops right there. It prefers grain to all other foods, but will take juicy fruit and tender young buds without hesitation. Apparently it has a liking for most crops valuable to men.

Eight pairs were introduced into this country in 1850 from England, in the hope that they would attack certain insects injurious to cereal crops. The birds did not thrive well, and three years later a second batch was imported and liberated in New York City. This second shipment *did* live and multiply. After seventy years the English sparrow stands second only to the robin as the most numerous bird in the United States!

While the destruction of plant buds by the English sparrow is of common note, there are a few other species which have this habit. Several of our finches, and the ruffed grouse in particular, are partial to this kind of diet in winter. From an economic point of view, however, the damage done is small. A ruffed grouse requires from 800 to 1000 buds a day when the snow is on the ground, but these are buds of forest trees; their loss is not felt. Noticeable harm, on the other hand, is caused by finches, who snap off the living buds from cultivated shrubs and fruit. The farmer has attended to the pruning of his stock,

and any further cutting back reacts detrimentally to the plants. Not many winter finches have contracted this habit, and those that have more than compensate for their crimes by consumption of weed seeds.

7**The Kea Parrot**

In the previous chapter we mentioned the acquired habit of the rhinoceros-bird of South Africa of picking at the backs of cattle until blood flows. The birds gained the habit from eating the blood-filled ticks which adhere to the backs of the beasts. In somewhat the same way the kea parrots of New Zealand have evolved a taste for the flesh of sheep.

Originally these parrots were entirely insectivorous, with perhaps a weakness for succulent fruit. Shortly after the introduction of sheep into New Zealand, they formed a habit of approaching the sheep-stations during the cold winter months in order to pick up scraps and offal thrown out by the herders. When a sheep was killed they picked the flesh from the bones of whatever portion was thrown away. So pleasant did the taste of flesh become that gradually the birds forsook their natural diet of fruit and began to attack the living sheep. It is now their

48 THE IMPORTANCE OF BIRD LIFE

habit to alight upon the backs of the victims and with their long hooked bills to burrow through the wool down to the warm flesh.

So severe has been the damage wrought upon the New Zealand sheep herds by these aberrant parrots that a price has been placed upon their heads; and they rightfully deserve the annihilation now facing them. Fortunately, the species is confined solely to New Zealand, and does not enter into the economic relations of the rest of the world.

8

The Cash Value of Birds

It is difficult to arrive at any close estimation of the cash value of birds to agriculture. Many such calculations have been attempted, but most of them leave a wide margin for argument. Probably the most equitable comes from Mr. McAtee, of the Biological Survey at Washington. He figures that each bird will destroy each year insects to the value of ten cents. With a population of more than four billion birds breeding in the United States, their annual savings to agriculture would then amount to at least four hundred million dollars. As insects annually damage agricultural crops in the United States to the tune of more than one billion dollars, it can be seen that birds have an appreciable cash value.

Added to this is the value rendered in the destruction of weeds and rodents. The daily consumption of weed seeds alone amounts to thousands of tons. The value of weeds, however, can only be measured by the amount of labor and time it takes the farmer to eradicate them. The cash thus saved must amount to a large total.

Useful birds of prey average about two noxious rodents a day as food. If a field-mouse is capable of inflicting only one cent's worth of damage upon farm crops, every mouse-eating bird will consume about seven dollars' worth of mice a year. Allowing to a hawk a life span of ten years, then each such bird must potentially be worth seventy dollars to the United States.

In the northeastern States there are at a low estimate two birds residing on every acre of land. We shall call forty acres the average farm, thus allowing eighty birds to each farmer. Every bird, if it lives for five years, is worth, according to McAtee's figures, fifty cents as a destroyer of insects. As a consumer of weed seeds let us suppose it is valued at half that. This will give the birds an average value of seventy-five cents apiece, or a total of sixty dollars for the farm.

On every two farms there should be at least one beneficial bird of prey, a hawk or an owl, whose value alone is seventy dollars, or thirty-five dollars to one farm. Added to the above, this gives us a total of ninety-five dollars for

50 THE IMPORTANCE OF BIRD LIFE

every forty acres. In other words, the presence of birds enhances the value of land for the agriculturist by nearly two dollars and a half an acre!

CHAPTER III

THEIR EFFECT UPON HEALTH AND THE WORKS OF MAN

- 1. The Number of Birds.**
- 2. Their Destruction of Insects Obnoxious to Man.**
- 3. Their Effect upon Dikes and Canals.**
- 4. As Scavengers.**

1

The Number of Birds

In order to obtain a more than casual understanding of the effect in bulk of birds upon human society, the Biological Survey of the United States Department of Agriculture instituted, in 1914, a bird census. As it was obviously impossible to make a physical count of every feathered individual in the United States, the department selected a number of average tracts of land upon which to make a study. Included were sections of farm land, villages, marshes, forests, and mountains. A definite count of the birds residing there was to be made. Volunteers were called for from the various rural districts and a great many reports solicited from measured areas.

The result of this first census was the accumulation at Washington of an enormous amount

52 THE IMPORTANCE OF BIRD LIFE

of statistics, especially from the northeastern States. The Survey averaged up the various figures and estimated the number of resident birds to the acre. In the following year the experiment was repeated, and it soon became an annual event, care being taken to correlate the yearly reports from the same areas. Soon the Biological Survey was satisfied beyond a doubt that it had hit upon the proper method for taking a census. Each annual report virtually coincided with that of the previous year.

The reports were most numerous in the northeastern States, and so often have the counts there been taken that there can be no hesitancy in vouching for their correctness. Each farm, then, in New England, New York, and New Jersey contains about one and a third pairs of nesting birds to the acre. The population of the forests is about the same. Thus in New York State there are roughly sixty million native birds and from seventy-five to eighty million in New England. These, it must be understood, are only the resident population,—birds that nest there,—while several times that number pass through during the year on their migrations. According to these figures there are several billion birds residing in the United States without counting those which visit Canada and Greenland.

The most numerous of all birds in the East is

the robin. Although originally a forest thrush, it came into the open fields after the early settlers had cleared the land, and it found there a more suitable home than the deep forest. Once established in the clearings, the robin increased in such numbers that it now holds the record for all land birds. Civilization for it has proved a boon.

Following not far behind the robin is the alien English sparrow, which at its present rate of propagation will some day not far off head the list. Then in the order named come the catbird, brown thrasher, house wren, kingbird, and bluebird. The crow stands well up on the list, but raptorial birds, long victims of human misconception, are down near the end, a lowly position into which gun and trap have forced them.

2

Their Destruction of Insects Obnoxious to Man

In agriculture the economic value of birds is based entirely upon the requirements of their stomachs. The same condition holds true for the birds who make our barns and roofs their home. One seldom pauses to deliberate upon the causes which led the nighthawks and the swallows to swoop and streak an erratic course through the air above the barn-yard or pasture.

54 THE IMPORTANCE OF BIRD LIFE

In a vague way we realize that they are seeking insects, but our imagination ceases to work further; the actions of such birds are too commonplace to be worth a second thought. And yet at that moment those very birds may be consuming mosquitos at the rate of several a minute or snapping up itinerant house-flies which later would have made our kitchens their home. Five hundred mosquitos have been taken from the stomach of a nighthawk—merely the remnants of one meal. Barn swallows are inordinately fond of house-flies, and, together with the swifts, they destroy thousands of winged ants.

One of the most important economic functions of wood-ducks, mallards, and others is their habit of destroying enormous numbers of mosquito larvæ which infest the pools where they feed. This fact was learned some years ago and brought into public prominence by Dr. Samuel G. Dixon, commissioner of public health in Pennsylvania. He estimated that if the birds were present in their numbers of a hundred years ago, they would prove of vital importance in checking the spread of malaria. Market gunners, however, and the general indifference of the public to a promiscuous slaughter of our game-birds have made this forever impossible. Wood-ducks at present are not far from extinction, and mallards and green-winged teal are in a fair way toward suffering the same fate.

Dr. Dixon, before issuing his statement concerning the mosquito-destroying capabilities of ducks, first proved his theory by practical experiment. Two ponds, each about 1400 square feet in extent, were selected. In one pond he placed goldfish; the other was reserved for ducks. Within a short time mosquito larvæ swarmed in the fish-pond, but none could be found in the pool given over to ducks. Then, to demonstrate the superiority of birds over fish, ten mallards were placed in the fish-pond, and within forty-eight hours the larvæ had been eliminated.

Dr. Dixon has provided a practical demonstration of what ducks are capable of doing. For those of our readers who are desirous of eliminating mosquitos from small bodies of water which exist on their land, this provides a feasible method not difficult to follow. Wood-ducks are among the most beautiful of all birds and easy to procure from licensed wild bird breeders. They are ornamental and highly efficient mosquito destroyers. Mallards are almost as bright colored as wood-ducks. They breed well in captivity and are not difficult to rear.

Their Effect upon Dikes and Canals

A minor though highly important function in some localities is the destruction of crawfish by

56 THE IMPORTANCE OF BIRD LIFE

birds. Herons are mainly responsible, crawfish forming a large part of the food both of the grown birds and of their young.

Although crawfish destroy a large number of young fish and attack the roots of corn and cotton plants, for which ravages alone they should be condemned, their chief guilt lies in the destruction of levees and dikes. These little crustaceans have inflicted incalculable damage upon the levees of the lower Mississippi. Many serious floods have been the result of their fondness for burrowing through mud to the source of water. A dike honeycombed with crawfish-tunnels is no longer safe. Within the last year thousands of dollars have been expended in New Jersey upon a canal whose walls have been undermined by the persistent creatures. Other thousands of dollars are now to be expended in exterminating the crawfish.

Owing to the former feather trade, herons of almost every sort have suffered a great reduction of numbers in the United States. There are living to-day only a tiny fraction of 1 per cent. of what there were seventy years ago. The species which mainly inhabit fresh water areas are particularly fond of crawfish, and in former days, in addition to the preservation of levees, thus saved to the Southern planters many hundreds of thousands of dollars' worth of crops. Since the destruction of the birds, however, immense

damage has been done to the cotton- and corn-fields of Alabama and Mississippi by the crustaceans.

4

As Scavengers

Perhaps the most important minor relation of birds to mankind is their work as scavengers. Although many species function in this way, the best known group is the vultures.

So great has been the need in nature of a street-cleaning department that two separate kinds of vultures have arisen. The vultures of the New World are quite different in anatomical structure from those of the Old World. They have evolved along parallel lines; that is all. The external appearance is virtually the same, their habits are similar, and their functions are identical, but the birds are not closely related. They come from two different stems of the hawk family.

In most tropical cities the streets are tenanted by great numbers of vultures who "police" the gutters of garbage which, if left to lie there, would soon pollute the entire neighborhood. The meat-markets are infested by them, and they greedily swallow all discarded scraps of meat. So active is the efficiency of the "turkey-buzzards" in our own Southern States that, except in the cities and large towns, dead animals are seldom buried. The bodies are dragged to

58 THE IMPORTANCE OF BIRD LIFE

an open field and the bones are picked free of flesh within a few hours.

But vultures do not inhabit all regions; they do not care for too temperate a climate. There crows and ravens take their place. As scavengers these are almost as efficient, but, owing to their smaller size and inconsiderable digestive capacity, they cannot as individuals consume as much carrion. Crows were at their best on the battle-front during the late war. In America they prove of immense sanitary value by devouring the dead fish and mussels which have been cast upon the beaches by the waves. The grackles also aid materially in this.

Gulls as scavengers are quite as accomplished as crows. They are the guardians of our harbors. Drifting offal proves more alluring to them than living organisms. Every vessel as it puts out to sea is followed for miles by hovering flocks in search of morsels tossed overboard. The waters of New York Harbor are daily swept by their wings as the gulls scan the surface for floating débris. Hundreds of tons of foul garbage is thus destroyed which, if left to the mercy of the tides, would be swept ashore to pollute the air with noisome odors and to breed disease. All of them—vultures, crows, and gulls—make the world a cleaner place to live in.

CHAPTER IV

DOMESTIC FOWL

1. The Game-Cock.
2. Early Domestication.
3. Breeds of Fowl
4. Poultry Farming.
5. Egg Production.
6. The Turkey.
7. The Domestic Goose.
8. The Domestic Duck.
9. The Guinea-Fowl.
10. What is coming?

1

The Game-Cock

About the year 479 B. C. Themistocles led a Greek army in a crucial battle against the Persians. History relates that just as the opposing ranks were about to close in the final struggle Themistocles cried a halt to his phalanx and commanded his men to watch a cock-fight then taking place on a small plain between the two armies. The struggle between the two birds was prolonged. They fought gamely and to the finish. Then, only after one of the gallant combatants lay bleeding on the ground, with its conqueror, exhausted but pluckily ready for a renewal of the strife, swaying drunkenly before it, did the general lead his phalanx to the charge.

Whether the anecdote is authentic or not, it is amusing to imagine the effect of a similar cock-

60 THE IMPORTANCE OF BIRD LIFE

fight on a modern battle-field, interfering, for instance with the struggle for Soissons, Château-Thierry, or Vimy Ridge. Spurred on, however, by the brave example of the birds, Themistocles and his men fought a winning fight against superior numbers. The entire Persian army was finally routed and slain.

The Greeks were naturally jubilant over the result of the battle, and the cocks received full credit for the victory. After the return of the army to Athens the soldiers instituted an annual cock-fight in one of their temples to commemorate the victory, which was regularly attended with proper religious fervor. So refreshing did the spectacle of these fights prove that within a few years the birds began to be matched for sport alone; and thus the cock-fight became an established form of entertainment in Europe.

Cock-fighting in England, next to stag-hunting and falconry, for centuries was considered the sport of sports. Henry VIII set his seal of approval upon it by erecting a large wing—the Royal Cockpit—to his palace, and henceforth cock-fighting became a “sport of kings.” It continued as a most popular form of entertainment for several hundred years until the advent of horse-racing placed it in the background. A law was finally passed in Great Britain in 1849 which for humane reasons abolished the sport and prohibited the holding of mains. It is now discoun-

tenanced virtually everywhere on the Continent of Europe with the exception of Spain. It meets with disfavor in the United States, but all Latin American countries hold the cock-fight in national approbation.

2

Early Domestication

Although there is little economic value in the game-cock, the bird is unique because it represents in a domesticated condition the closest approach we have to the red jungle fowl, the wild progenitor of the common fowl. Four distinct species of these jungle-fowl still exists, all inhabiting the Indo-Malayan region of Asia or the adjacent islands. Three of them do not thrive particularly well in captivity, but the fourth, the so-called red species, easily breaks away from a feral state. This species is the forefather of *all* our domestic fowl.

According to the old Chinese encyclopedia published in 1596, the first of these birds was introduced from the West into China about 1400 B. C. This is the earliest authentic mention of the domesticated fowl. No remains have been found in the ancient Swiss lake-dwellings, nor is there mention of it in the Old Testament. It was unknown to the old Egyptians and to Homeric Greece. In India the people first began to breed

62 THE IMPORTANCE OF BIRD LIFE

the fowl some time between 1200 and 800 b. c.

When the domesticated bird was at last firmly established in India, it spread rapidly westward. By 700 b. c. it was to be seen figured on Babylonian cylinders. A century or so later it had reached Europe, though, strange to say, not Italy. When the Romans conquered Gaul and later Britain, they found the fowl already naturalized in those two countries. They believed it to be a native of Gaul, and called it *gallus*.

From China these domesticated jungle-birds quickly spread to what is now Siberia and were utilized by the nomadic tribes which roamed there. Their first foothold in Africa was obtained through the Egyptians. To America the first birds were brought by the Spaniards, together with the horse. American breeds have since been introduced into the East; and thus the domestic fowl has completed its westward cycle from the region of its birth.

3

Breeds of Fowl

If any wild species of animal or bird is held in domestication for a sufficient number of generations, abnormal characteristics, such as albinism, changes in color-pattern, or almost any non-conformity to the original type, are sure to crop out in some individuals. Some species, however,

are far more susceptible than others to such a change in environment and quickly diverge from the normal. One of these species is the red jungle fowl. Under domestication it soon loses its identity. Owing to this fact, the first people who bred it in captivity, though probably unfamiliar with any of the present theories of artificial selection, took advantage of every change of coloring, size, and shape to fit the bird to their needs.

Thus new breeds, sub-breeds, and varieties rapidly came into existence. At an early date some European breeds were clearly established. Columella, the famous Roman agricultural writer, in the first years of the Christian era stated that he "particularly recommends as the best those sorts [of chickens] that have five toes and white ears." Seven breeds are known to have existed in China in 1596, and about the same number were described as Italian by Aldrovandi, in 1600, in his "Natural History." Darwin recognized only twelve breeds, but under the heading of each he named numerous subdivisions.

Since the publication of Darwin's "Animals and Plants under Domestication," artificial selection has played a greater part in the destiny of domesticated creatures than ever before. Selection has become a definite science, governed by well-established fundamental laws. The re-

64 THE IMPORTANCE OF BIRD LIFE

sult has been a great increase in the number of breeds of fowl and an enormous addition to the list of minor varieties and strains. For example, there were in the time of Darwin about seven recognized varieties of Polish fowl; now there are nearly thirty.

The following are a few of the fowl now employed in America. We have buff cochins, brahmas, Plymouth Rocks, wyandottes, Orpingtons, Rhode Island reds, chittagongs, Indian games, Malays, black Spanish, Leghorns, blue Andalusians, Minorcas, Anconas, Hamburgs, Houdans, dorkings, Faverolles, and langshans. These are virtually all utility breeds, whereas there remain a great quantity of fancy varieties of minor economic value, and innumerable bantams.

The origin of some of these breeds and strains is highly complex. Many are the result of crosses and re-crosses and inter-crosses so mingled as to defy any attempt at analysis. Some have been recently created; others are almost as ancient as European civilization. Native American strains are comparatively new, whereas the five-toed dorking, for instance, was introduced into Britain by the Romans.

Of all the modern American breeds, the Plymouth Rock has proved the most important. The name was first applied to a very much crossed fowl produced in 1850, but this bird was not the

forebear of the true Plymouth Rock. The breed probably originated in 1870 as the resultant of any one of six different crosses, all of which produced the same type of bird. The basic stock was the Dominique, the name applied to a fowl of common lineage and blue, gray, and white mottled appearance. Upon this bird the following crosses were made: (1) Spanish crossed with white cochin, the result bred to the Dominique; (2) Dominique mated with a buff cochin; (3) white Birmingham on black java, the produce coming white, black, and Dominique—Dominiques alone bred together; (4) any of the above crossed with the Dominique; (5) black java on Dominique; (6) some of the above crossed with the brahma.

Second only to the Plymouth Rock in importance as an American breed is the wyandotte. This also originated in 1870, coming from a cross between the Hamburg and the light brahma. The breeds used in making the Rhode Island red—the third most important American-bred fowl—were the red java, the chittagong, the red Malay, and the cochin-china. This fowl was the result of long years of selection for a bird which would include the three factors that stand nearest the poultryman's heart: eggs, broilers and roasters.

Although a considerable number of strains of Orpingtons are the product of American breeders, the original Orpington was developed in England. The Leghorn arrived from Italy, being probably

66 THE IMPORTANCE OF BIRD LIFE

of Spanish ancestry, though our knowledge of its source is meager. It, however, was introduced into England from the United States. Most Hamburgs, despite their German name, are English. The brahma is the result of a cross between the cochin and the gray chittagong, the first cochin having been imported from Shanghai. Notwithstanding the general utility of all these foreign breeds, the United States owes nine tenths of her egg production to native stock, with the addition of the Leghorn.

Speaking from the point of view of economics, the utility fowl has always been the most important factor in poultry culture. It was, however, only a few decades ago that scientific treatment of the utility bird was undertaken. Until the nineteenth century was well along there were no great poultry farms or production of eggs and fowl on a big scale. Market produce came from the small farmers; poultry and eggs which reached the cities were those left over from the requirements of the farm.

But in those former days, while there was little attempt to establish utility flocks of great size, a wide-spread craze was prevalent for creating new and fanciful looking breeds—something that would please the eye if not the stomach. Oddly caparisoned fowl were sought for, birds with crests which burst from the top of the head like

chrysanthemums, others with cauliflower combs, silky hackles, bright colorings, feathered legs, and hairy or curly feathers.

So great was the depth of variation in this domestic species that the fanciers obtained almost any form they desired. Almost any weird combination of external characters could be found and "fixed" by selective breeding. Davenport states that "there have been reared chicks with toes grown together by the web, without toenails, or with two toenails on one toe; but with two pairs of spurs; without oil-gland or tail (though from tailed ancestry); and with neck nearly devoid of feathers. . . . "

Included in his description are fowls with a swelling on the top of the skull which causes large crests of feathers to grow on the head; ill-formed feathers which cover the body like tangled hair; and feathers which grow forward along the body instead of backward. Of the comb he has secured "a score of forms: single, double, triple, quintuple and walnut, V-shaped, club-shaped, comprising two horns, or four or six, absent posteriorly, absent anteriorly, and absent altogether." These are but a few of the possibilities which confront the breeder of grotesque types. Therefore it is not difficult to see why, before the cry for more eggs and more poultry was raised by the rapidly increasing city populations, the

68 THE IMPORTANCE OF BIRD LIFE

breeder was tempted to perpetuate them. With his meager knowledge he selected along the lines of least resistance.

From their earliest beginnings, however, the United States and Canada, Australia and many colonial possessions of Great Britain, did not take so kindly to the production of fancy fowl as the older countries. With them life was a struggle for existence; the pioneers of a new land could not afford to waste their energies on material which brought no economic return. Their attention was riveted upon the development of the new territory. Fowls as food were a necessity, ornamental birds a superfluous luxury.

With this axiom inculcated in them from their earliest colonial days, Americans have made production their greatest aim. Therefore it happened that they were the first people to place poultry-raising upon a truly scientific basis. New breeds, entirely utilitarian, were established. Old breeds were renovated by the addition of new blood, and fresh strains evolved. From Italy were brought the Leghorn fowl, and, because they were excellent layers, they received popular approval. American breeds became famous, and presently native varieties from the New World were flowing across the Atlantic to Europe and England.

But the older countries, though slow to begin, soon caught up with the rush of activity under

way on the other side of the ocean. Great Britain was especially quick to realize that home consumption of poultry was fast outstripping home production. In characteristic fashion she took the matter in hand. "Utility" societies were formed, worth-while prizes offered, and everything was done to encourage the breeding of flesh- and egg-producing fowl. Soon her poultry industry was greater, in proportion to the small area of territory involved, than that of the United States. The industry proved a gold-mine for Ireland.

4

Poultry Farming

It was about 1870 that the world suddenly awoke to its need for more poultry. Since the advent of the breech-loading shot-gun, feathered game had showed a marked decrease throughout Europe. Shops were no longer filled with game-birds, and something was needed to take their place. Small farmers attempted to stop the gap with poultry, but the demands of the people greatly exceeded the meager allowance that the peasants were able to scrape together. The value of poultry rose to a premium; a sudden impetus was given to the fowl industry.

The ordinary system of setting a hen to hatch a clutch of eggs had hitherto proved profitable,

70 THE IMPORTANCE OF BIRD LIFE

but it was slow. The time had now arrived when small business measures no longer would do. The markets called for poultry in enormous quantities. The result was the introduction of incubators on a wide scale. It was discovered that, instead of the clumsy communal contrivances employed by the ancient and modern Egyptians, machines could be built to serve the purpose of individual producers at a minimum cost in money and labor. Small incubators became the fashion, and modern poultry-raising thus received its start.

The poultry-business in fifty years has increased tenfold. Under present methods the chicks are placed in a heated brooder-house twenty-four hours after they arrive from the incubator. The brooder-house usually is a small room with an easily regulated stove in the center. Around the stove is a low, circular hood, raised a few inches from the floor, under which the chicks may gather without getting burned. This is termed the "hover," and, if the temperature is too great beneath its folds, the chicks have access to the farther parts of the room where the heat is less.

As soon as the chicks are a few days old they generally are permitted to run in a small enclosed yard adjoining the brooder-house. After their down feathers are shed it is safe, if the owner so desires, to let them roam around a larger yard or even over the farm at will. This, however, applies only to pullets and young stock

later to be used for breeding purposes. Chicks reared especially for the market should be kept in close confinement in order that all food consumed may go toward the production of flesh. They never are allowed to leave the small runway outside the brooder-house.

The earliest age for marketing chicks is when they are about six weeks old. At the present day these young "squab-broilers," weighing about three quarters of a pound, have considerable vogue in America, where they have successfully taken the place of small game. They are equally sought for in Europe, where they are employed for the same purpose.

When the chicks are eight to twelve weeks old they become full-fledged "broilers." These are purely an American creation, the business of producing them on a large scale having been initiated at Hammonton, New Jersey, between 1880 and 1885, when a number of large plants were opened. Since that date the "broiler" business has developed into one of the most lucrative phases of poultry husbandry.

Probably the most ancient of all "special" classes of fowl is the capon. It was well known to the early Romans and as highly relished then as now. The caponizing operation is performed on the young cockerels of heavy breeds when they are two or three months old, and thereafter the growth of the bird is very rapid. Fowl thus

72 THE IMPORTANCE OF BIRD LIFE

treated will reach a weight of ten or twelve pounds, while their flesh remains soft and tender.

But capons are a specialty in the world of poultry and, although attaining much popularity in America, they still fall behind the birds known as "roasters." These are individuals graduated from the "broiler" stage, which have reached five or more pounds in weight. "Hens" are fowl which have passed the one-year mark. They are fricassee or boiling fowl.

In case a young cockerel is intended to become a "roaster" it undergoes a process of fattening for ten days to a month before marketing. This fattening, or "cramming," of fowl has existed as an art in Europe for two thousand years, but only within the last generation has it been widely undertaken in the United States.

Cramming may if necessary be done by hand. The fattening food then is made into a thick paste, which is rolled into pellets and forced down the bird's throat. The victim thereupon is returned to a narrow fattening-pen to await a repetition of the dose due in a few hours. In place of pellets, however, a funnel may be introduced into the throat and the food poured down as a liquid. Again, a machine resembling a meat-grinder is sometimes employed. In this case a tube is fitted into the mouth of the caged cockerel, a man turns the crank of the machine, and the food is forced into the stomach. The first system



BUFF ORPINGTON COCK



Courtesy of Lee S. Crandall

THE RED JUNGLE FOWL—ANCESTOR OF ALL
DOMESTIC BREEDS



BUFF ORPINGTON CAPON

Compare size and shape with the cock
above



Courtesy of Lee S. Crandall

SILKY BANTAMS—A CREATION OF THE
BREEDER'S FANCY



of cramming is too laborious to be utilized on a big scale; the other two are excessively cruel to the bird.

When the fowl is ready for the market all food is withheld for a few hours previous to the killing. The killing is done with a sharp knife by severing the large arteries of the neck through the mouth. A sudden twist causes the knife at the same instant to penetrate the brain, causing immediate and painless death. Plucking is undertaken at once; should there be a delay of only a few minutes the skin becomes strangely soft and easily tears. The average picker works with great speed and can completely denude twelve fowl an hour.

After the small pin-feathers have been removed with a knife and the body singed, the bird is placed in a shaping-trough. This consists merely of two boards placed lengthwise at right angles and nailed. The fowl is placed breast down with a third board weighted and pressing upon its back. The flesh is thus forced downward toward the breast. As it cools the flesh hardens in place, giving the fowl the appearance of owning a full breast, a delusion meant for the eye of the prospective buyer.

The production of poultry has reached greater proportions in the United States than in any other country of the world. The government census reports of January 1, 1920, showed that there

74 THE IMPORTANCE OF BIRD LIFE

then existed more than a third of a billion living fowls in this country. In other words, there were three of these birds present to every person in the United States. Iowa led with twenty-seven million, and in New York there were more than ten million with a value of \$15,348,600. Including all the fowl reared and sold during the months before the census was taken, the value of poultry in the United States reached the tremendous sum of a billion dollars.

5

Egg Production

Fully as important, however, as the poultry themselves are the eggs they are responsible for. Egg production and how to increase it offers a wealthy field to experimenters and scientific breeders. To heighten the level of average flock performance is the universal aim, and, though much has been accomplished in that direction, there is still great room for improvement. "An egg a day" has been the war-cry of breeders for more than thirty years, but the hens have yet a long distance to travel toward the attainment of their ultimate goal.

Nowadays it is not uncommon for individual hens to lay more than 200 eggs in a year, but a large flock seldom approaches that average. Such an instance has occurred, however. A flock of

600 Leghorns made a record of 196 eggs apiece! In England a pen of eighteen birds once laid more than 200 eggs to the hen, and at Cornell University a single leading spirit has accounted for 258 in one year!

Although the breeder relies upon selection to produce his prolific strains, he gives a great deal of thought to the proper feeding of his flock. The number of eggs a hen is capable of laying depends entirely upon her food. In order to do her best, she must receive a well-balanced ration, one which contains a sufficiency of protein, or muscle-and energy-producing food, together with carbohydrates whose function is to make fat and develop body heat. These are administered in large enough quantities to counterbalance the elements consumed in restoring waste tissue, the production of an egg, and the generation of heat. To the ration are added plenty of water and green food for maintaining the water-content of the body and eggs, and for serving to keep the bird in proper health and production.

Attempts by other means than the selection of good strains and scientific feeding have been made to increase the laying capacity of a flock, but thus far they have met with a small amount of real success. Working under the fallacious idea that the hen, upon missing her egg, will soon replace it with another, people have constructed trap-nests in which the egg rolls away from the hen

76 THE IMPORTANCE OF BIRD LIFE

as soon as it is laid. The use of artificial light has also been tried, the object being to prolong the daylight hours. Although some flocks have actually been made to increase their output by this means, the practical value of the system has not yet been wholly proved.

Arriving at the consumption of eggs in the United States, we find that it matches that of poultry. There were more than a billion and a half *dozen* placed on the market in 1919, or about 180 eggs per capita. New York City alone daily consumes between three and four million. The production in the United States, though it did not reach the figures of the previous year, was valued at more than half a billion dollars. The average adult city dweller annually spends about \$20 on eggs.

But, despite the enormous quantities eaten, there is always a surplus left over. This is employed in a number of ways, for export, canning, drying, and in divers industries. Although for the present exporting is at a low ebb, there are encouraging signs that it soon will return to a pre-war standard. The canning and drying of eggs, however, continues, and each year hundreds of millions are cared for in this way. Calico-printing consumes approximately half a billion each year; book-binding, glove-making, and other leather industries take about half that amount. And before the ratification of the Eighteenth

Amendment about a hundred and twenty million were utilized in clarifying wine.

Eggs are not so abundant in Great Britain as they are in America. There, as with her poultry, the home-grown supply has never been sufficient to meet the demand. Until the beginning of the World War, England was forced to depend largely upon the European markets. So large was the number of eggs imported that they came to about fifty-five for each person in England and Scotland. Russia was the chief beneficiary of the trade, with an annual export surplus valued at more than \$15,000,000. Denmark exported about half that much. The United States did not figure, except in a small way, until 1915, when she took the place of the belligerent European countries.

What the domestication of the red jungle fowl has meant to mankind cannot be indicated in actual figures. The fowl has supplied food to countless millions of people through a hundred generations. It has brought a money income and livelihood to untold numbers and has made possible the survival of hundreds of thousands of small farms. Without it the world would have missed a factor of tremendous importance in the advancement of civilization. To-day the combined annual poultry products of the world probably exceed the great American war debt in value. They have been estimated at \$25,000,000,000.

The Turkey

The descendants of the wild jungle fowl, however, are not the only domesticated birds to which the world owes an everlasting debt of gratitude. There are, among others, the turkey, the duck, the goose, and the guinea-fowl.

The first bird, a native of North and Central America, was introduced into Europe about 1530 by the Spaniards. It has been contended that Cabot or another British explorer brought it to England at an earlier date, but documentary evidence fails to prove its presence there before 1541. Be that as it may, the turkey obtained a firm foothold in Europe within fifty years of the discovery of America. There, in Mexico, it had been in a state of semi-domestication for centuries before the arrival of the white man.

Again, the uncertain origin of the name "turkey" has also been the cause of considerable controversy. As the bird did not come originally from the land of the Turks, the name cannot have arisen as a common appellation of that country. Some authorities imply it to the resemblance of the tassel on the head of the bird to the red fez of the Turkish costume. Others believe that it may have arisen from the word "turquoise," in conjunction with the blue excrescences on the

neck. A third contingent say that it is a *turkey* because the bird is as overbearing as a Turk. The reader may take his choice.

Unlike the jungle fowl, the turkey under domestication does not show a wide range of variability. It thrives under the care of man, but is slow to yield to artificial selection for new types. There are only a few recognized breeds, either in the United States or abroad. The largest of all these is the American bronze, the chief commercial turkey of the States. English breeds are not so large, and the French are still smaller; but even the great bronze cannot compare with the largest of the wild birds. Wild gobblers have been shot weighing sixty pounds or more, whereas an extraordinarily large domestic bird will tip the scales at forty-five pounds.

There is no more difficult domesticated bird to rear than the turkey. The newly hatched chicks are especially affected by any sudden change of weather. A downpour of rain may prove fatal to an entire brood. Their food also requires close attention. At an older age they are highly susceptible to disease; an epidemic of blackhead or roup may wipe out a flock within twenty-four hours. When fully grown, however, the turkey is as hardy as any fowl.

Production of these birds in the United States annually runs into several millions, a majority of which are consumed on Thanksgiving day or

80 THE IMPORTANCE OF BIRD LIFE

Christmas. As a general rule, small buyers collect them in small lots from the farmers. When sufficient have been gathered together the turkeys are driven in flocks to a common butchering ground, where they are killed and prepared for market. Although they are often driven for days along the highway, their progress is slow and they generally reach the place of slaughter in good condition. Owing to their superior quality of flesh, the demand is great, and the price of turkey remains at a high level. In 1919 there were birds to the value of about \$13,000,000 in the United States.

7

The Domestic Goose

Although in America the turkey stands second to the domestic fowl in economic importance, it is only slightly in advance of the goose. This, so far as we know, is the most ancient of all domesticated birds, for it was known and fattened by the Egyptians 2000 years before Christ. The Romans also knew it well and regarded it as a sacred bird. Nevertheless, its sanctity did not protect it from the Roman epicures, who deemed the liver of a white goose the choicest of all morsels.

While never so popular a table dish in America as in Europe, and Germany especially, geese are

produced here in greater numbers than anywhere else in the world to-day. This is due more than anything else to the great territorial size of the United States, although there is a great demand for upholstery feathers. The bird itself is not highly popular on our tables, and within the last decade the number reared in America has decreased by one third.

Thousands of geese are killed each year in Germany for their liver, out of which is manufactured the famous *pâté de foie gras*. To secure the *pâté* the birds are fattened until their livers swell to enormous size. The methods employed to obtain this diseased condition are many, and all are unalterably cruel. They need not be spoken of here.

Because of the ancient origin of the domestic goose it has proved difficult to trace with absolute certainty its lineage. The ancestor of the Chinese breed has never been authentically identified. On the other hand, evidence points toward the wild graylag as being the forefather of the European breeds. This bird is still taken in the wild state by the Laplanders and lives well in captivity.

Virtually all the breeds found in the United States come either from Europe or China. Despite its long period of domestication the goose has not shown a tendency to vary far from the native type. Thus in all we have merely the large

Toulouse goose, the Emden, and the African breeds from Europe, and two small Chinese varieties, the brown and the white, from the Orient, with one or two other varieties of minor importance. The native Canada goose shows signs of reacting to domestication, and the time may not be far distant when new breeds of this species will be produced.

8

The Domestic Duck

Next in importance to the goose is the duck. With the exception of the Moscovy duck of South America, all our breeds have descended from a single world-wide species, the mallard. Like the red jungle fowl, this bird responds to domestication by wide divergence from the original.

So great has been the breadth of variation that it is difficult to believe all our domestic forms arose from a single parent type. Darwin divided them into four great structural breeds: (1) the common domestic duck, in which are included the Pekin, Rouen, the tufted duck of Holland, and the Labrador; (2) the hook-billed duck, an ancient breed and an excellent layer, first observed in 1676; (3) the call duck, small and noisy; and (4) the penguin duck, which probably originated in the Malayan archipelago and is now known as

the Indian runner. Since Darwin's time many other breeds have been added to the list.

By far the most important of all the varieties and strains is the Pekin. Although outranked in parts of Europe by the Rouen and the Aylesbury, it is the commercial duck of the United States. Millions are consumed here and large numbers are produced. Iowa alone, in 1920, reared nearly a quarter of a million.

Large duck plants generally are situated near a body of water,—a stream, lake, or bay,—although this is not an absolute necessity. The birds begin to lay in December or January and continue until June. The ducklings are hatched in large incubators and marketed when from nine to twelve weeks old. The average plant with one or two thousand breeders will produce from twenty to forty thousand young ducks. As many as ninety thousand, however, have been sold from one ranch in a single season.

9

The Guinea-Fowl

Not quite so popular as the duck is the guinea-fowl. A native of West Africa, it has been under domestication from the time of the Phenicians; but in all these thousands of years it has scarcely altered one tithe from the original form. Unlike other domestic birds it has never lost its

distrust of mankind. It is a wary creature and if loosed in an uninhabited locality quickly returns to a feral state.

Because of its suspicious nature the guinea-fowl is generally left to hatch its eggs and rear its young by itself. The bird therefore does not lend itself to commercial production on a large scale. Nevertheless, there were nearly two and a half million of these half-wild fowl in the United States in 1920. Their numerical increase has been large in the last decade, owing to the fact that their flesh is gamy and palatable. In a large way they have taken the place of game in our markets.

10

What Is Coming?

Despite all our domestic breeds of chickens, geese, turkeys, ducks, and guinea-fowl, poultry husbandry is only in its infancy. There are many other species to be heard from. In North America the Canada goose bids fair to be the fore-father of a valuable domestic breed. The Muscovy duck of the Amazon and northern South America already is established as a commercial breed and soon may fight for honors with the Pekin. The South American tinamou and curassow, now running wild in their native jungles, are possibilities of the future. With the growing

enthusiasm for breeding game-birds in captivity now in vogue, what new and economically valuable domestic breeds may not arise?

No one can foretell just what scientific methods of breeding and selection will discover a hundred years hence.

CHAPTER V

DOMESTIC PIGEONS

1. Their Ancestry.
2. Domestic Breeds.
3. Tumblers.
4. Trap-Shooting.
5. Pigeon Flying.
6. Pigeons As Messengers.
7. Pigeons As Food.

1

Their Ancestry

The pigeon is one of the oldest domesticated birds on record, and, like the goose, its earliest history is shrouded in antiquity. It was figured by ancient writers shortly after the dawn of history and at the present day is described in the literature of all nations.

The first authoritative note concerning this bird comes from the fifth dynasty of ancient Egypt, with an antiquity of 4500 years. There we find a pigeon pictured on the walls of the tomb of one of the great princes of that day. Later, Solomon is reputed to have utilized it as a message carrier. Reports of the Olympic games were forwarded in the same manner to the Greek cities. Still later, the first official word of the successful conquest of Gaul was received in Rome by "pigeon post." Thus, at the beginning of the

Christian era, the domestic pigeon was already an old established breed.

Like the barn-yard cock, the pigeon and all its races arose from a single ancestral form, the wild rock dove. This species still exists in England and the mountainous parts of Europe, extending through Asia down into India. Both the wild and domestic forms live together in perfect harmony, and both are found on the streets of Paris, the rock dove as much at home as its more specialized brother and nearly as tame. The wild bird has been attracted to the city where, while retaining its freedom, it can at the same time take advantage of what the civilization of mankind has brought.

At this point it may be well to define the difference between a pigeon and a dove. There is no anatomical distinction between the two. A line of demarcation does not exist. "Dove" is the Anglo-Saxon term and "pigeon" the Norman, and the latter bears the same relation to the former that "mutton" bears to "sheep." "Pigeon" has been adopted for the domestic bird by common usage. That is why it is not wrong to say that the bird descended from a rock "dove."

Darwin was the first to suspect the wild species as the progenitor of the race, and he proceeded to demonstrate his theory in characteristic fashion. Even in the earliest recorded descrip-

88 THE IMPORTANCE OF BIRD LIFE

tions, the domesticated bird retained few or no color markings which might confound it with its wild ancestor, but Darwin was used to obstacles of that sort and did not despair of obtaining proof. He first crossed a white fantail with a black barb, and another black barb with a white bird with a red spot on its forehead and a reddish tail. The offspring of these two crosses were then crossed between themselves, and the resulting birds not only resembled rock doves, but *were* rock doves so far as any analyst could tell. Darwin had proved his point and fixed the ancestry of the domestic form.

2

Domestic Breeds

With the average person a mention of the word "pigeon" is generally attended by two reacting thoughts: messages and food. As a matter of fact, the bird in its present status in civilization is not a food product of great economic value. It also has gone out of fashion as a means of transporting messages since the invention of the telegraph, save only in times of war, when it still plays an important part. Its chief popularity is now based on performance as a skilful and speedy flier, together with the decorative value of its fancy varieties. Thus the missions of the domestic pigeon are, or have been, four: (1)

decoration, (2) the making of sport, (3) the carrying of messages, and (4) food.

Of the domestic varieties of olden times we know very little. None exist to-day in their earliest forms, for all have been lost in the progression of fresher and more modern breeds. The antiquity of a few of our present breeds, however, does extend back to the close of the sixteenth century, and we find the pouter, the fantail, and the jacobin apparently well established at that time.

To-day there are in existence about two hundred different varieties of domesticated pigeons, but many are merely slight variants from a more staple central breed. Thus, for example, there are a dozen or more strains of fantails and many more of pouters. Of the thirty or so recognized central breeds the fantail, the owls, the Oriental frills, and certain of the tumblers originated in the East. Africa produced the barb and one or two others of minor value. From the United States came the American high-flier, and Europe is responsible for a whole galaxy of breeds. A few of the latter are the Antwerp, the dragoon, carrier, turbit, jacobin, Cumulet, nun, magpie, helmet, the German toy-pigeon, and the giant runt. As may be gathered from the above list of names, the appellation given to a breed generally implies some special ability of the bird. The homer has developed an instinct for homing,

90 THE IMPORTANCE OF BIRD LIFE

the pouter pouts, and the tumbler tumbles. Certain high-fliers are tritely named tipplers.

It is impossible to decipher the origin of many breeds, so confused are they with crossing and re-crossing. While several have come up, so to speak, from the dark ages, others evolved in regions where we are unable to find a trace of their ancestry. Certain breeds have been created by selection for speed and homing ability, some for the performance of aërial acrobatics, and others for color combinations and strange body adornment. In the last class fall the fancy sorts such as the hooded jacobins of many colors, the black shields, and the fantails. Show homers and exhibition tumblers are not performers in the air, but take preëminence in the show pen.

Pigeons are one of the species particularly susceptible to artificial selection, as much so as the domestic cock. Not only do we find a great variance of color and marking among them, but a wide divergence in actual form and character. The fantails, for instance, have an enormous, fan-like spread of tail, the feathers of which number from thirty to forty or more instead of the normal fourteen, and the bird is so "chesty" that it resembles a fat man beating a bass drum. A great feathered hood curves forward over the head of the jacobin and hides the eyes and bill. The Oriental frills own, in addition to frills, large crests and complicated color patterns. The pouter

is able to puff out the feathers of its throat until it seems as if the bird had swallowed an orange. The short-faced tumbler is endowed with an extremely short beak and a bulging forehead. The legs of the shield are heavily muffled in feathers which stick outward like an extra pair of wings. The runt, a utility breed and the biggest of all, sometimes weighs two and a half pounds. These are only a few of the results of artificial selection.

Again, returning to the color of the birds, we learn that the "standard colors," as recognized by fanciers, may be white, black, dun, red, or yellow. Blue, silver, mealy, and cream are "off colors." Checkers—birds with bar markings—may be blue, black, or red, but never silver, dun, or yellow.

3

Tumblers

With this short review of what goes to make a "fancy" bird, we shall pass on to the more important "sporting" breeds and those which help make sport. They are the ones which attract most attention in this country and Europe, and may be divided into three general groups: (1) breeds selected for agile flying and quick manœuver in the air; (2) birds used for shooting (no particular breed); and, most important of all, (3) breeds

92 THE IMPORTANCE OF BIRD LIFE

selected for speed of wing. The first division includes the tumblers and rollers.

The art of tumbler and roller flying has attained its greatest perfection in England. Of late years, however, it has been much practised in the United States. Birmingham, England, is the center of the sport, and from that place have radiated most of the present performing breeds. Birmingham contains a big population of pigeon-fanciers and their annual Christmas competition has a world-wide reputation.

The process of tumbling or rolling consists of the turning of a backward somersault, or a series of them, by the birds in mid-air. This agility is developed to a greater or less extent throughout the entire breed. The Birmingham roller excels in the art, being capable of executing twenty or more backward flips in succession. So swift are the revolutions that the eye finds it difficult to follow them. A flock or kit of a dozen birds, flying high and suddenly spinning over and over, is not only a startling sight, but the movement is one of extraordinary grace.

The tumbler tumbles not from any exuberance of spirits but because there is no help for it. The bird has been bred for generations to tumble. As in the case of the waltzing mouse, a defect of the inner ear, or possibly of the brain, has been fixed in the breed by artificial selection, and therefore the individual is incapable at times of

maintaining its equilibrium in the air. The bird is actually a defective. Thus, care must be used in breeding it, as the bird may tumble too far and hurt itself. Individuals have been known to start downward from a considerable height and to continue twisting head over heels until they crashed to the ground. These are known as "mad-rollers" or "roll-downs," and should never again be flown. The ideal tumbler is one which goes through several somersaults, recovers itself, and lives to tumble again.

Breeding these varieties is a difficult as well as fascinating pastime. The most careful selection is necessary. No mad-rollers can be taken as parent stock lest the offspring fly a short course to grief. Patience on the part of the trainer also is essential. Once having produced birds of conservative tendency, the problem of the kitflier is to teach his subjects to perform evenly and in unison. Those which tumble out of time with the rest must be eliminated or taught to perform better. Training a kit takes both time and perseverance, and when the owner has produced a flock which meets full requirements he rightfully deserves all the praise he can get, either from himself or his neighbors.

4

Trap-Shooting

One of the most popular sports in England dur-

94 THE IMPORTANCE OF BIRD LIFE

ing the second half of the last century was pigeon-shooting. It also had a firm foothold in the United States for the last few years of that period, but societies for the prevention of cruelty, and the invention of clay "birds," soon forced it into the background. The sport of breaking these imitation birds now has far more adherents than ever were attached to live pigeon-shooting. The "birds" are merely concave disks of darkened clay strengthened by the addition of certain tar products, which gives them a partial resistance to the impact of fine bird-shot. They are flung swiftly through the air by spring machines and afford an excellent flying target. To break one it is necessary to strike it with several pellets of shot.

Doubtless live pigeon-shooting afforded much diversion to the marksmen, but the same cannot be said of the victims. Considerable variation occurred in the methods employed by different clubs. The most general rule, however, was for the shooter to stand in the center of a sixty-foot ring of traps containing birds. Strings ran from the traps to the middle of the circle, and a jerk served to release the prisoners. The marksman was supposed to kill the pigeons within a set distance of the traps. Therefore, any wounded individuals which happened to fall out of bounds were not counted in the score. Those which escaped were free to roam at will.

and offer a target to any one who wished to take a pot-shot.

A number of years ago the author attended a pigeon shoot in New Jersey. A large part of the local population, especially boys, had gathered at a safe distance to view the spectacle. The country was rugged in character, and each inequality hid a youth, as did each tree-trunk and every large boulder or post-and-rail fence. The sportsmen in the center were ringed by a half-mile circle of ancient army muskets of Civil War vintage, Flober rifles, and shot-guns of all types and descriptions, either single- or double-barreled, muzzle- or breech-loading. If a pigeon escaped from the men at the traps,—and many did escape,—the weapons of the callow multitude went into action. The air was continually alive with flying pellets of lead, and the neighborhood was treated to a noisy imitation of the Battle of San Juan Hill. Birds which happened to succumb to the fusillade later found a way into pigeon-pies; other more fortunate individuals returned to their natal roosts to be sold again for the morrow's sport. Such was at least one pigeon shoot in America.

But live pigeon-shooting is now a dead sport in the United States, as it is in most European countries. In Monaco alone does it still retain high favor, and there it is undertaken more as a betting medium than anything else. Clay "birds" have elsewhere taken its place, and now

96 THE IMPORTANCE OF BIRD LIFE

trap-shooting holds a higher rank in our national sports than ever before.

5

Pigeon Flying

Of all the sports, however, in which both men and domestic pigeons take part, pigeon flying or racing is far in the lead. It is a form of recreation favorably regarded by the people of all nations. There is not a country in Europe where pigeon flying does not meet with approval. The Egyptians, the Italians, the Turks, the French, the British, and the Germans all take part.

But it is to Belgium that the world owes the true beginnings of the sport and its development to the present high state of accomplishment. The Belgians bred the racers and are still doing so. They were the first people to take advantage of new strains reared in other countries, and, by crossing and selection, produced the celebrated Belgian strain of homer which has become the basis of all modern breeds of fliers. The recognized national sport of Belgium is pigeon flying, and the flying homer is the king of all fliers, its national sporting product.

Let us be sure that we understand what true pigeon flying is. It may be defined as racing with pigeons. It consists of flying one bird against another or several over a course of measured

length, or the flying of a bird against time. Time, in other words, speed, is ever a matter of the greatest pride to the owner and invariably receives the highest commendation from the judges, not only because the fastest bird wins, but because its speed may set a new record. The pigeon flier is like the owner of race-horses. Many a horse can win a mile race, but there are few that can cover the distance in less than a minute and forty seconds. Therefore, the man who produces a 1:38 horse has something to be proud of besides winning a pocketful of prize-money. The race-horse runs its races around an oval track. The properly trained homing pigeon, on the other hand, flies in an almost straight line from the point of liberation to its loft, be it fifty, one hundred, or five hundred miles distant.

As has been said, the sport took its beginning in Belgium. The year of the first organized race was 1818, and the length of the course one hundred miles. This distance was gradually increased until in 1875, when the sport was first introduced into the United States, races of five hundred miles were common in Europe.

In the days before railroads it was a difficult matter to ship birds a long distance from their lofts owing to poor facilities for travel, but with the coming of railway-trains this hardship was obviated and longer races became possible. The United States took advantage of the railroads,

98 THE IMPORTANCE OF BIRD LIFE

and in 1879, only four years after the introduction of the first flying strains, the initial 500-mile course was flown in this country, from Dayton, Ohio, to Philadelphia. Seven long flights were made the same year, and with each successive year the number increased.

It had always been the ambition of breeders to produce birds capable of covering the 500-mile distance in a single non-stop flight of one day. Hitherto the course had consumed two or several days, a flying day being measured from an hour before sunrise to an hour after sundown. At last, in 1885, the breeders reached the goal of their desires. "Ned Damon," a pigeon owned in Brooklyn, flew from Abingdon, Virginia, 508 miles in fourteen hours and twenty-five minutes at an average speed of 1033.62 yards a minute. From that time to the present many birds have covered the distance in non-stop flight, and in 1898 a pigeon from Buffalo attained the remarkable speed of 1608.4 yards for the distance—not far from a mile a minute! In the same year four birds flew seven hundred miles in a *single day* at a speed of 1546.97 yards a minute! Thus far the 1000-mile course has never been covered in a single flight, although "Bullet," who holds the world's record, accomplished it in one day and eleven hours, daylight flying.¹ The greatest distance traversed

¹ Homing pigeons fly only in daylight and roost at night wherever they happen to find themselves.

by any trained homer is reputed to be from Denver to Springfield, Massachusetts, or 1689.44 miles. About a month was consumed by the bird in completing the journey.

Mention of the above records at once brings up a question which has long lurked in the back of our minds. How fast can birds fly? Authentic information on this question is meager indeed. Speed of birds has long formed a subject for heated discussion, especially among sportsmen, and we have often heard that some wild ducks attain the remarkable velocity of 150 and even 200 miles an hour! Such, apparently, is not the case. The fastest recorded time for ducks is ninety miles as determined by telegraph from point to point. The English partridge, also a fast moving target, has been measured as doing only 28.4 miles an hour. It is seldom that a barn-swallow or a chimney-swift passes a train traveling forty miles an hour. The average rate for homing pigeons does not much exceed that speed, but that is only the average. Some homers are swifter than others. Flights by pigeons of a mile a minute are yearly becoming more common, and one bird has flown one hundred miles at the truly phenomenal rate of 2511.87 yards, or virtually a mile and a half a minute!

Homing pigeons are bred for speed and homing instinct. That a bird can successfully undergo artificial selection for an instinct sounds strange,

100 THE IMPORTANCE OF BIRD LIFE

but a glance at the progression of distances traversed through the medium of that instinct shows it to be an accomplished fact. From a few hundred miles, the birds have been bred in a single century to find their way over a stretch of nearly seventeen hundred. The instinct to return straight home to their cote, be it a thousand miles off, had, in 1918, a much firmer grip on the bird than it had in 1818. This homing ability is of course the all-important factor in "flying." The breeder, therefore, uses as parents of his flock only those birds which have flown fast and homed from afar.

The pigeon-loft should be large and roomy, and it must be fitted with a trap-door leading to the outside. This is contrived in such a manner that the bird may freely enter, but finds its exit barred. Training is begun when the youngsters are about three months old. Their first flight is from a place half a mile distant from the loft. The next course is one mile, then two miles, and by easy stages up to fifty miles. Once assured that the birds will cover this distance without getting lost, the trainer increases it to seventy-five and then to a hundred miles, and so on until the maximum distance required is reached. Young individuals, as a rule, are seldom flown over courses of more than 300 miles, but birds of the year have covered the 1000-mile distance.

During transportation from the loft the con-

testants are carried in closed wicker baskets. It should be understood that the birds do not return to the place where they are "tossed" but to their lofts many miles away. The exact time of liberation is taken by specially constructed clocks, as is the time of arrival at the home loft. This arrival home does not mean a perch on the peak of the loft roof, but the absolute second the pigeon passes through the trap-door. Thus, considerable patience is entailed on the part of the trainer to teach the birds to drop directly to the platform in front of the door and to push through. When the time at the loft and the time at the place of tossing are compared the difference shows the time of flight. The distance covered is reduced from miles to yards and the result divided by the number of minutes, the speed of flight thus being obtained in yards to the minute.

6

Pigeons as Messengers

Although as message carriers pigeons were used by the ancients, it was not until the Belgians developed racing strains that the "pigeon post" was seriously taken up by the governments of Europe. Up to that time almost any home-flying breed would do, and as a consequence many important despatches went astray. But the day came when the birds officially received recognition, and

then began the selection which has continued until to-day. As early as the beginning of the nineteenth century we find a well-organized pigeon postal service established by the Dutch in Java and Sumatra. Immediately after that period and continuing until the advent of the telegraph killed it, the pigeon post found general favor throughout Europe.

In those days as now, the desired message was written on a thin sheet of paper, which was then rolled up and thrust into an empty quill. This in turn was secured to a central tail-feather of the pigeon, and the bird was permitted to proceed on its way. The method now in vogue varies considerably from this. The message is placed in a metal cylinder which is fastened to the leg of the bird by two flexible aluminum bands. The cylinder is of aluminum, about one and a quarter inches long and three eighths of an inch in diameter. Paper of great lightness is employed, so that messages of considerable length may be sent.

The telegram proved a damper to the pigeon post, and the birds fell into disfavor as message carriers. Then came the Franco-Prussian War and the siege of Paris. That city was for several months cut off from ordinary means of communication with the outside world. It was invested by a wall of glittering German steel. Well nigh every attempt to send out a message was frustrated by the capture of the courier. There re-

mained, however, the pigeon; and once more the birds came into their own. By the day the actual siege had begun, the military authorities within the city had exchanged numbers of pigeons for others from outlying districts. They had reorganized the long forgotten and wholly defunct pigeon post.

Thousands of despatches were delivered and received during that siege. The letters at first were inscribed on ordinary paper and photographically reduced to thinner sheets. Later they were printed in common type and microphotographed on filmy sheets of collodion. So light were these films that 50,000 despatches could be sent by one pigeon.¹ Upon arriving at their destination the films were projected upon a screen and the message, thus enlarged, was copied off. Later still, a sensitized screen was used and the message was developed directly upon it.

It is not to be supposed that the Germans were entirely unaware of this system of transmitting news from the beleaguered city, or that they took no precautions against it. As they knew that the birds could be flown only in daylight, expert shots were stationed on all high ground and in tree-tops over which the pigeons might fly. What the toll taken by these men amounted to history fails to state. But it does say that the Prussians went so far as to train hawks to capture the pigeons,

¹ "Encyclopædia Britannica"; article on "Pigeon-Post."

104 THE IMPORTANCE OF BIRD LIFE

though even their own historians admit it was a useless expenditure of time and energy.

After the close of that war the pigeon service became a recognized element in the French military establishment and lofts were maintained in all fortresses. Other European countries stocked their forts with birds, but, aside from this, pigeons as messengers again fell into disuse throughout the world. At the outbreak of the World War, however, they once more were utilized.

In 1914 the French army reorganized the pigeon service and greatly widened its scope for actual work in the field. England, though she had employed the birds with success in the South African War of 1899-1902, was slower to recognize their value, and it was not until the spring of 1916 that her armies in France received the first birds from home. But, from that time on, her pigeon service at the front grew until it stood on an even footing with that of the French and the Belgians. When the United States joined forces with the allies, she had no such arm in her service, but upon going into action she quickly realized the necessity for one. Pigeon flying at that time was popular in America. At the outbreak of hostilities thousands of birds, trained by private owners, were on hand. A pigeon service was hastily organized, and great numbers of birds were shipped to France, where their progeny saw service on the front lines.



Photograph by
Elwin R. Sanborn

Courtesy of the
N. Y. Zoological Society

THE MESSAGE IS PLACED IN A METAL CYLINDER FASTENED TO THE
LEG OF THE BIRD BY TWO FLEXIBLE ALUMINUM BANDS



Photograph by
Elwin R. Sanborn

Courtesy of the
N. Y. Zoological Society

A LOFT OF HOMING PIGEONS, SHOWING THE TRAP-DOOR





The pigeon corps of the American army was modeled more or less after the French and English. Permanent lofts were constructed behind the lines not far from the front, and, in addition, there was a corps of mobile lofts capable of following close at the heels of the army. Approximately 200 birds were apportioned to each loft, and after a short period of training they were ready for work. Each loft was in charge of a non-commissioned officer who saw to it that the birds were sent forward to the men in line and whose duty it was to transmit despatches taken from homing birds to headquarters.

Each day a man was sent forward from the loft to the front line. His conveyance was a motorcycle to which was secured a large basket, sufficient to hold as many as seventy or eighty birds. His journey to the front was made in somewhat the following manner: first to an aviation field to leave a dozen birds; then to brigade headquarters of the artillery of that sector, or the various battalion headquarters; and finally to regimental or battalion headquarters of the infantry where the remainder of his cargo was disposed of. At this last place the pigeons were distributed to the different companies, two birds to each; and the courier returned to the loft to await developments.

It was a hard service for both pigeons and men, but war is severe on everything and every

106 THE IMPORTANCE OF BIRD LIFE

one. The birds were trained to trap at once upon returning to the loft in order that their messages might immediately be taken. Woe betide the pigeon who, while an important infantry action was under way, failed to respond to its training. If it should fail to trap, if it perched on the roof of the loft or the top of a building, a shot-gun was leveled and the bird was blasted to eternity. War is cruel, and despatches are valuable.

Pigeons quickly became accustomed to the sound and concussion of gun-fire and flew without hesitation through the heaviest barrage. Their greatest value to the soldier came at the time when the infantry had "jumped off" to an attack. An advance party might be cut off from communication with the rear by enemy fire. Telephone wires might be severed and the runners killed. At such times pigeons formed the only connecting link with the main force. In this manner did the famous "Lost Battalion," which in reality was not lost at all, send back the coördinates of its position to the higher command.

In a similar manner the French commander of Douaumont, at Verdun, when the fort was cut off, communicated the news to his general that he still held out and would continue to do so until the last man fell. He made good his word, and when Douaumont did fall to vastly superior forces its resistance had blocked the main German attack for so long that Verdun was saved.

The pigeon which flew through that hell of fire, which no human being could stem, received the Croix de Guerre and the everlasting blessing of the French nation.

But war pigeons did not always pass through gun-fire unscathed. A member of the American pigeon service once informed the writer that a bird returned to his loft in the Toul sector with a broken leg and a deep two-inch gash in its side. Another bird, belonging to the British service, "was struck by a German bullet which broke one of its legs, denuding the bone . . . of all flesh, and drove the metal cylinder containing the message into the side of its body, the bullet passing out of its back. In spite of its wounds, and although out in the wet all night, the bird struggled home to its loft, a distance of nine miles, and delivered its message."¹ Surely, that pigeon had earned the V. C.!

The Germans had the advantage over the allies in reference to army pigeons. The whole of Belgium was theirs to draw upon. At least a *million* birds are known to have been commandeered from that country during the war. Some of those very carriers were captured by the American forces during one of our drives and, as the pigeon lofts were then behind our own lines, performed excellent service for us.

Although homing pigeons, if left to themselves,

¹ Gladstone, "Birds and the War."

only fly by daylight, the French attempted, with some success, to breed night fliers. The squabs, from the moment of hatching, were kept in darkened lofts and fed by the light of red lamps. When the birds became old enough to fly they were permitted to leave their quarters at night and underwent a systematic training of homing to a red light.

This system worked with fair results, but the homing of the birds was an uncertain quantity. Any red light would attract them, and, owing to eye weakness and disease, they were far shorter lived than daylight birds. Night flying was not attempted in the American army during the war, though preparations were being made for it when the armistice came. Since that time, however, successful experiments have been made in that direction by the section of the United States pigeon service stationed at Panama. Distances of forty miles have been attained by night-flying homers.

Certainly not the least important part pigeons took during the war was their help to the aviation corps. They became a recognized unit of equipment for aëroplanes in many branches of that service. In order to release a bird the machine was slowed down and the bird was tossed backward toward the tail of the craft to prevent its fouling the propeller. Numerous messages were sent in this fashion, and there were many instances

in which the pigeons carried word of planes in distress. For example, a large British machine was brought down in the North Sea fifty miles from shore, where it drifted helpless for several days. The commander had four pigeons, one of which he released each day until all were gone. The last bird, starved by four days' lack of food, set off through a fog and finally succeeded in reaching land. It fluttered down to a coast-guard station, and there, with its message still attached to its leg, fell dead from exhaustion. The six men on the wrecked plane were saved.

7

Pigeons as Food

Although it would be possible to recount a score of tales such as the one just related, there is no space left to do so. We must therefore turn to the fourth province of the pigeon, its economic place as food. The pigeon doubtless has always been eaten by epicures, ever since its first domestication, but never did it attain the same popularity as poultry. It is found, nevertheless, in all our markets to-day and therefore holds a certain status as a food product.

The reasons for the lack of popularity of the pigeon as a market product are not difficult to decipher. The flesh of an adult bird is inclined to be tough; owing to the unreliability, then, of

110 THE IMPORTANCE OF BIRD LIFE

the consistency of its flesh, the bird cannot command a price sufficient to pay the cost of upbringing. One would think that it might in some measure have taken the place of small game-birds in the market, but this has not proved the case. More pigeons were produced in the United States in 1910, while game-birds were still being sold, than in 1920. That toughness cannot be overcome.

The story of the squab, however, is entirely different. Its flesh is quite as tender and delicious as any epicure could desire. Unfortunately the rearing of squabs has drawbacks which preclude them from ever becoming an important market bird. On paper the raising of squabs is more lucrative than most businesses. One pair of birds theoretically should produce from seven to ten pairs of young per annum. The market price varies from twenty-five cents for culls to at least a dollar apiece for the best birds.

Let us suppose that we ourselves are going into the business. Instead of ten we shall figure upon eight pairs of squabs a year to every pair of breeders. They are to be sold at only seventy-five cents a pair, making a gross return of six dollars from our breeders. The average cost of feed and loft care can be put at one dollar and a half. The result is \$4.50 net profit a year from one pair of old birds! A thousand pairs should net the comfortable income of \$4500—on paper.

Be that as it may. Although an untold number of failures have occurred in the squab business, some people *have* made good. It may be that the breeder owns the proper housing facilities for his birds; he may have the nests arranged in the order that they should properly be in; he may have a ready market near by; he may feed the squabs by correct formula; he may have the patience of Job; but success will be lacking unless he has the *knack* of producing squabs. This ability is something that all the books and all the formulæ in the world cannot teach a man; it must be born a part of him. And when the breeder does have the gift, he lives "happy ever after."

Squabs are reared in well-ventilated, vermin-proof lofts and placed on the market generally when four weeks old. The mother bird lays two eggs, and when the nestlings are about three weeks of age she deposits two more in a near-by nest. She incubates the second clutch while the male completes the rearing of the squabs. For the first five or six days after hatching, their sole food consists of "pigeon milk," a soft milky substance formed in the crops of the old birds and regurgitated into the mouths of the young. On the fifth or sixth day the youngsters begin eating grain and, with the addition of their "milk," continue to do so until they are fit for the market.

Upon being dressed for shipment, the squabs are graded according to weight, at so many pounds a dozen. Those that weigh a pound apiece are known as "jumbos" and fetch the highest price. Any birds below eight pounds a dozen are culls, and little profit can be derived from them.

The breeder naturally selects strains of good flesh- and bone-producing birds. The best of these are the American Antwerps or homers, being prolific, of good size, and gentle breeders. Other excellent varieties are the white German homer, the Belgian homer, the dragoon, the Dutchesse, and the runt, ranking in the order named. Because light-colored squabs bring the highest prices a cross between the white German and the American Antwerp makes an ideal market bird. The young of the dragoon are larger birds, but they take five weeks to rear, instead of four. The runt is the largest of all, a veritable giant, but seldom produces more than four pairs of young a year.

The production of squabs reached its zenith in the United States just before the breaking out of the war in Europe. The trade is a local one and the birds must be reared near their market. A sale direct from the breeder to the consumer is the one most sought for, and apparently it is the only means by which the grower can be assured a profit. Before the World War, however, con-

ditions were more favorable. The breeders then dealt with the wholesale market much more than they do now. One small country village in New Jersey sent 86,000 squabs to the market in one year. A single grower in the same county shipped nearly 25,000 that season. Those birds alone were worth \$50,000; but a few years later, in 1920, all the farms combined in the United States owned pigeons to the value of only ten times that sum. Squab raising has not proved profitable.

CHAPTER VI

BIRDS TRAINED TO HUNT

1. The History of Falconry.
2. Types of Hawks.
3. The Training of the Hawks and Their Work in the Field.
4. Their Food.
5. Modern Falconry.
6. Fishing with Birds.

1

The History of Falconry

The art of hunting with specially trained hawks is about as ancient as written history. It is only now, after a lapse of thousands of years in which the sport prospered, that we find it drifting toward an eclipse in civilized countries.

In the far-off days, when game was plenty and the means of securing it few, men were forced to depend largely upon their bows and spears for food. Arrows were both expensive and difficult to make. While they did very well for large animals, a small bird was scarcely worth the expenditure of one, and spears proved ineffective. Yet small birds were delicious food, titbits highly prized when they could be obtained. Men therefore set their intelligence to work. They devised snares, invented bird-nets, and finally turned to birds of prey to do their killing for them. Later

men taught certain sea birds to fish for them.

It is not difficult to conceive how a man—or boy—first undertook to employ birds of prey for his own personal profit. He was a man of the open plains, one initiated into the habits of wild hawks. Month after month and season after season he had watched the falcons strike at their quarry high up in the heavens and had observed the baser goshawks swoop and twist in savage pursuit of low-flying victims. As he was possessed of imagination, the idea gradually grew in his brain that one of those very hawks might be tamed and properly trained to capture quarry for its master. Without much trouble he snared a hawk, gentled it, and put his ideas to the test. Success attended his efforts—and a new means for obtaining food had been discovered. In some such way falconry doubtless first had its beginning.

As far back as 2000 B. C. we learn that hawks were utilized for taking game in China. Three hundred years later—and possibly before, though the records fail to show proof—the sport had become established in Persia. Some falconers of India, where hawking was introduced a short time later, firmly believe that Persia was indeed its home. Such a supposition is quite reasonable; the sport—or art—might easily have had a simultaneous origin in different parts of the earth.

Although falconry was at first utilized as a means for capturing food it soon lost its purely

116 THE IMPORTANCE OF BIRD LIFE

utilitarian phase. It was too fascinating a game to be played only by pot-hunters. The Egyptians of the middle dynasties were inordinately fond of it. They hailed it as a sport for recreation hours, though one highly advantageous to the larder. From Egypt it spread to Greece and later to Rome.

The half-civilized tribes of Europe accepted falconry in the same manner that China had more than a thousand years before. It was merely a new means of procuring meat, and apparently it remained on that footing for several centuries. The employment of it as a sport did not come into vogue until the time of the first crusades and probably was derived directly from the Saracens, who had already followed it for centuries. At any rate, the first great boom of falconry in Italy and France broke out in the ninth century of the Christian era. In England all men, be they serf or thane, had enjoyed its thrills and spoils, but with the arrival of the Normans it became a "noble" sport. Henceforth the high social status of falconry was fixed throughout Europe. Only the nobility could fly the best birds, and as a sport it ranked on an even footing with stag hunting. Centuries passed and its popularity waxed rather than decreased. Then, one sorry day, gunpowder and the fowling-piece appeared. The "kingly" sport waned into obscurity until now it has only a few followers in Europe.

Types of Hawks

Before entering into a discussion of hawking as practised in Europe during the Middle Ages, and, for that matter, to a small extent to-day, a more detailed description of the proper kinds of hawks should be given. Three well-defined, anatomically differentiated groups of raptorial birds are employed: the long-winged falcons, the short-winged hawks, and the eagles. Of these the last never reached great popularity in Europe, a fact not only due to the native sluggishness of the birds while on the wing, but because emperors, according to feudal practices, were the only persons permitted to fly them. Eagles, however, have attained a certain prominence among many present-day Asiatic tribes. Nevertheless, we shall confine ourselves for the moment to those hawks which have played such a great part in the past history of both England and France.

First in order of virtue come the falcons, the long-winged group, including gerfalcons, peregrines, sakers, merlins, and kestrels. Gerfalcons inhabit Scandinavia, Siberia, Iceland, Greenland, the northern United States, Canada, and the arctic regions. Peregrines are spread largely over the entire world, the duck-hawk being the American representative of these birds so famous in mediæval history. Sakers are subtropical or tropical

forms of the peregrine. The merlin is represented in America by the pigeon-hawk; so alike are the two birds that an ornithologist can scarcely tell them apart. Kestrels also have a world-wide distribution, the American sparrow-hawk being quite similar to the kestrel of falconry.

Useless as a bird-catcher and lacking the dash and courage so necessary for taking game on the wing, the last named species, alone of all European falcons, is of small value to the falconer. In the wild state the natural food of the kestrel consists of grasshoppers and field-mice; any bird which it by chance captures is taken only by stealth. All other falcons, except to some extent the hobby,—a bird not mentioned above because so closely related to the kestrel,—are diametrically opposite in character. Meat is their food—meat obtained by capturing their warm-blooded quarry alive. To them belong all the dash, the grace, and the swiftness for which hawks are noted. They command the air with their superior flight. Mounting sufficiently high, they poise above their victims, then drop with swishing wings and strike with savage talons. When falcons are properly trained, they hurl themselves at the appointed quarry regardless alike of its size, fierceness, or wicked bill. They have no fear for their own safety. Again and again will they return to the encounter until the enemy is driven to earth, defeated and dying, or they have succumbed to their

own prowess. They are courageous, dauntless. Falcons were the birds of kings.

Although the short-winged hawks lack the grace and perhaps the speed of falcons, they make up for the loss by fierceness of attack. Their mode of accomplishing this is most businesslike. No time is wasted circling above the quarry. They dart from their perch directly at their victim, literally fling themselves upon it, or give stern chase. The onslaught is less spectacular than that of the falcons but is highly productive of result. Unlike the long-winged species, they do not hesitate to plunge headlong into a thicket or wooded copse in the pursuit. There are no "stoops," startling recoveries, or graceful evolutions—only an exhibition of clever aerial dodging, and all the thrills attendant upon a straightaway race. These are the true game-getters, the hawks of the pot-hunters.

As indicated by their name, the wings of the short-winged hawks are shorter and more rounded than those of the falcons. These birds belong to a separate group of the great hawk family, known as the *Accipitrinae*. Included among them are the goshawks and true sparrow-hawks. The former, like the peregrines, have a worldwide distribution. The American goshawk is closely allied to the form inhabiting Europe. Sparrow-hawks also are found nearly everywhere, the Cooper's hawk and the sharp-shin be-

ing two American species. The latter is exceedingly difficult to differentiate from the European form; both own long tails, long shanks, and quite similar markings. The sharp-shin, however, is slightly smaller than the sparrow-hawk.

3

The Training of the Hawks and Their Work in the Field

In the training of hawks the falconer has to deal with four types of birds, the eyess, brancher, passage, and haggard. The first is a youngster taken from the nest. Branchers are young birds taken in the vicinity of their nest but old enough to fly. Passage hawks are birds of the year trapped during the migration season. Haggards are wild birds more than two years old. These names apply to both long-and short-winged hawks; thus there may be eyess goshawks and eyess peregrines.

Immediately upon being captured, regardless of whether the bird be eyess or passage hawk, the falconer secures a pair of "jesses" to its legs. The jesses are short leather thongs so secured to each shank that, while not interfering with the blood circulation, they cannot be withdrawn over the foot. These are never removed so long as the bird lives, and later in its training will serve to hold the short leash. If the hawk happens to be

a freshly caught adult, the jesses are secured to its legs only after the bird has been hooded.

When fully fledged, the eyesses at first are allowed to fly at liberty, or "on hack," around the place where they hitherto have been fed. Their flying capabilities are thus developed and their young muscles strengthened. It is also the custom, in order to save later trouble, to teach the young hawks while on hack to come to the "lure," of which more later.

After the eyess has remained long enough on hack to develop a taste for chasing sparrows and other small birds, and perhaps has disposed of one or two, it is taken up by means of a bow-net. Its serious training now begins. When disentangled from the net it is at once hooded. The hood is a small leather cap so constructed as to fit snugly, but not too tightly, over the head. Light and eyesight are thus cut off at once, and the bird becomes docile and easy to handle. From the moment the birds are hooded the training of the two classes—eyess and bird of passage—is alike.

The bird is placed on an especially constructed perch in a large, clean, rat-proof room, and secured there by a short leash tied to the jesses. It must now be tamed. This process may consume much time and patience or scarcely any at all, according to the nature of the hawk. The bird must be continually stroked, first with a feather, then with the hand, until it shows no

122 THE IMPORTANCE OF BIRD LIFE

further fear of handling by the keeper. The falconer then teaches it to leave its perch for his gauntleted fist, using food as an inducement. When the hawk grows so accustomed to his presence that it will come eagerly to his fist in search of food whenever he approaches sufficiently near its perch, the bird is ready for further training.

The falconer is now satisfied that his subject can safely be introduced to the lure. This, as a rule, consists of a padded weight to which are secured the wings of some large bird, like a pigeon or duck. It is provided with short strings by which pieces of meat attractive to the hawk can be tied to it. A long string enables the falconer to drag the lure or to whirl it around his head in much the same fashion that *Tom Sawyer* whirled his famous rat.

Having baited the lure, the trainer takes the hooded bird upon his fist. The hood is then removed and the lure tossed to the ground two or three feet away. The hawk, espying the meat and feathers, jumps for them and immediately begins eating. When about half the meat is consumed, the falconer entices her back to his fist with his voice and an especially acceptable titbit of flesh. The practice is continued daily until the hawk is thoroughly inured to the lure and fails to take alarm or offense at the actions of its master.

The next step is the employment of a "creance," a light string fastened to the leg of

the hawk. Thus secured, the bird is carried off on the fist of an assistant to a distance of about thirty feet and there unhooded. Upon observing a movement of the lure in the hands of the falconer it immediately flies back to it. The distance is gradually extended from thirty to one hundred feet and then the creance is dispensed with. Thereafter the flights to the lure are increased by short steps up to half a mile or more, with the final result that the hawk will return to the lure from any distance from which it can see or recognize it.

The bird is now sufficiently prepared to be broken in on live quarry. This is the last step before introducing it to field work. If, for instance, the special quarry is to be a partridge, a living specimen must be secured and flown from the end of a short string. The hawk, when unhooded, will at once take wing and bear the partridge down. Then, before being brought back to the fist, it should be permitted to make almost a full meal from its first victim. Two or three other tethered partridges should be sacrificed in the same manner before the hawk is fitted to fly at wild game.

The first trip in the field is the most important phase in the training of a hawk. Unless it kills the first bird at which it is flown, it may not bother to fly at another. If it kills at once, confidence is established in its own prowess and

124 THE IMPORTANCE OF BIRD LIFE

nothing but practice is needed for perfection. Thus, matters should be arranged to insure a kill. To make certain of success a trained bird-dog is necessary, one which will stand fast on a point.

In the case of a falcon, the bird is unhooded when the dog crouches to a point. Immediately upon being freed of the hood, the falcon takes to the air and, following the instinctive habit of its kind, rises to a good height, or "pitch." While the hawk is circling, the falconer approaches the dog and stands ready to flush the partridge at the moment the falcon gains the proper position to strike at the birds. An instant later the quarry go up with a whir. The falcon, singling out a victim, falls like a streak of gray light from the blue vault of the sky. The selected partridge falters on its course, then goes down, struck dead in mid-air, while the remainder of the covey vanish over the brow of a neighboring hill. Turning quickly, the destroyer plunges after its stricken victim.

Later in its work, when the falcon gains more skill, the trainer permits it to gain a greater pitch than at first before he so much as turns the hunting-dogs loose in the field. The bird, educated now, circles and hovers above the pointers until they locate a covey. Then, if the first field happens to prove barren of quarry, the falcon follows the dogs on to the next without returning to the wrist of the falconer.

Hunting with short-winged hawks is undertaken in a somewhat different manner. The bird is not unhooded until the quarry has actually taken wing. The dogs come to a halt, the falconer cautiously draws near; he flushes the quarry and then only does he unhood the goshawk or sparrowhawk on his wrist. The hawk immediately sights the partridge, launches out after it, and with a rush of wings strikes it down. Both partridge and hawk fall to earth together. Unlike the falcons who cause death to their quarry by a blow from their half-closed talons, these hawks kill by driving their claws into their prey. They "bind" to it and never let go.

The preferred hawk of falconry is the female. She is stronger, better able to cope with large quarry, savage, and therefore prized by falconers. Unless otherwise specified, hawks are generally designated as belonging to the feminine gender. They are perfect amazons, and it is to them that the names "peregrine," "merlin," and "goshawk" are applied. If the less noble male is to be mentioned it is merely termed a "tiercel" or a "jack" or a "musket." Two hawks flown together, not necessarily a pair, are termed a "cast."

Their Food

Although the training of a hawk has been some-

126 THE IMPORTANCE OF BIRD LIFE

what enlarged upon, little as yet has been said of the food of the captive birds. And yet this is one of the most important factors in their training. Too much care cannot be given to this item. Although the birds are not by nature delicate of constitution, they quickly show the effects of improper feeding, especially during an active campaign in the field.

The staple diet is of course meat, but meat in different forms, depending upon the species of hawk to be fed. A peregrine, being a large, rugged bird, subsists best on beef; but that is too coarse for the dainty merlin: she thrives better on sheep's heart. All hawks in the wild condition daily consume a large amount of fur, feathers, and bone together with the flesh of their victims, and this roughage is ejected later through their mouths in the form of oval pellets. Therefore, instead of soft beef, every third day or so the peregrine gets a pigeon, the leg of a fowl, or part of a rabbit with the fur on. Small birds and mice are fed to smaller hawks. If the falconer fails to discover any pellets, or "castings," beneath the perch within a few hours after the roughage has been devoured, he knows that the hawk is in poor condition.

The smaller hawks, like the merlin and sparrow-hawk, should be fed twice a day, at seven in the morning and five or six in the evening. The peregrine and goshawk, unless they are eyasses, re-

quire sustenance only once daily—in the evening. These birds will consume about half a pound at a meal—the merlin considerably less because of her smaller size. Cold meat should never be used, though it must not be heated above blood temperature. Finally, when taken out to hunt, the hawk should be hungry in order that she will be keen for the chase.

When a hawk strikes down her quarry, she is allowed only a mouthful or two—just sufficient to whet her appetite for more. It is seldom that the falconer allows her to make a full meal in the field, unless the day's hunting is over; the game generally goes into his bag.

The quarry of the merlin and sparrow-hawk in the wild state is small birds. They are therefore employed for taking larks, blackbirds, magpies, and sometimes partridges. Peregrines are flown at partridges, grouse, pheasants, rooks, crows, ravens, herons, and other large birds. They will even attack kites, another species of hawk, and the ensuing struggle is a true battle royal. Goshawks excel upon ground-game such as hares and rabbits, and are highly efficient at the capture of grouse and pheasants. Eagles are flown in parts of the world other than Europe, their specialty being larger game—gazelles, small deer, foxes, boars, and even wolves. The quarry list of falconry is indeed a formidable one.

Modern Falconry

Although only a few French, Dutch, and British enthusiasts now take pleasure in the sport, there was a period when it was considered as necessary for a member of a noble family to be familiar with all the intricacies of falconry as it was for him to be conversant with horsemanship. In those days—from the tenth to the end of the seventeenth century—the sport had a firm hold upon civilization. So powerful was its grip that many stringent laws, which seem wholly unjust and childish to us now, were enacted by various monarchs to govern its performance. A code was worked out which was adhered to by every one, royalty and serf alike. Special hawks were allotted to the various degrees of rank. To the king went the use of the gerfalcon; to the nobleman, the peregrine; to the yeoman, the goshawk; to the priest, the sparrow-hawk; and to the servant, the useless kestrel. A king naturally could utilize any hawk or falcon beneath his own in rank, but it was not permitted to the nobleman to fly a gerfalcon.

Severe penalties were imposed upon any persons who transgressed the law. During the reign of several English sovereigns, among them Henry VII and Henry VIII, the stealing of a falcon was

punishable with death. Elizabeth was more lenient; any one then convicted of this form of stealing was merely fined and imprisoned for a period not to exceed seven years! The prison term, under James I, however, was reduced to one month and the fine was set at forty shillings. Similar stringent laws were in effect all over Europe, and remained so until late in the seventeenth century. Then, they gradually relaxed. By the opening of the nineteenth century the theft of a hawk in England had been placed in the same category as the stealing of a fowl and was dealt with in the same manner.

While the practice of falconry as a fine art has virtually disappeared from Europe at the present time, it still has great popularity in other parts of the world removed from the glamour of modern civilization. Although unknown to the American aborigines, it is enthusiastically carried on in parts of the Old World wherever there exist nomadic tribes. As with the ancients, it is not merely a sport with these people, but a pleasant method of obtaining food. By means of desert falcons the Arabs procure gazelles and hares for the larder, an example which is followed by the inhabitants of Barbary and Morocco. The roving nomads of Siberia seldom travel without their hawks. In Turkestan falconry is regarded as the most popular sport of all. The

princes of India frequently enjoy it; falconry to them is still a high art. And it has a considerable vogue in the interior of China.

The hawks employed by all these Oriental peoples do not differ from those utilized a few centuries earlier in Europe, nor do the methods of training vary in any notable way. Added to the falcons and short-winged hawks, however, is a third bird, the eagle of the emperors, which under the name of *berkute* holds great favor in Turkestan and Siberia.

The eagle is trained in the same manner as other hawks and is flown like a goshawk. Owing to its great size and savage temperament, it is kept hooded at all times except when flown at quarry. It is capable of inflicting serious damage upon its keeper if once aroused; therefore the falconer employs the greatest caution in his handling of it. When the eagle is crouched upon the body of its victim the falconer approaches gingerly and pops a hood over the bird's head before he dares take it upon his fist.

Foxes and even wolves are common prey of this savage bird; but when a *berkute* binds to a wolf the battle may prove disastrous for the eagle unless the falconer hastens to the rescue. He rushes up and attempts to despatch the wolf with a blow of the club he carries, before the wolf can manœuver the eagle within reach of its jaws. Fox hunting is not so dangerous, and by this

means some Siberian tribes obtain the pelts which they use for barter at the trading-posts.

6

Fishing with Birds

Among all the hawks mentioned as being at some time or other trained to hunt for a human master, there is one species which we have failed to discuss. This is the osprey, more commonly known as the fish-hawk. Although the records are not clear on the subject, it appears that this hawk was once utilized in England for catching fish. The sport, however, did not gain popularity. The osprey could not be induced by training to deviate from its instinctive habit of flying to the top of a tall tree or post immediately its talons had closed upon its prey. Therefore the priests, who supposedly were responsible for the attempt to modify the habits of the hawk, soon gave it up as a bad job.

There is, however, another sort of bird, the cormorant, which is trained for this purpose. The art of cormorant fishing originated in the Far East and later was introduced into Europe, where for a short time in the seventeenth century it found favor. But its popularity there was short-lived; the sport was attended with little or no excitement. Now for a view of the art in practice one must travel to Japan, China, or Formosa.

132 THE IMPORTANCE OF BIRD LIFE

Fishing with cormorants is not a complicated business. The birds need scarcely any training. A young cormorant is captured and tamed by allowing it a sufficiency of fish as food. When the owner believes it old enough to begin work, he deposits it in a basket and carries it to the fishing ground. A metal ring is then slipped over the narrow head of the bird and down the neck to the shoulders. One foot is secured by a long string and the cormorant is tossed into the water. The fishing has begun.

Following its natural instinct, the cormorant immediately begins to dive and swim beneath the surface at great speed. Presently there sounds a slight splash near the boat; the bird appears with a fish gripped crosswise in its sharp bill. With a gulp it is swallowed, and the cormorant plunges once more beneath the water. These actions are repeated over and over again until the small fish, prevented by the metal ring from entering the stomach of the bird, distend its throat into the form of a pouch.

The owner now decides that his cormorant has caught all the fish it can hold and pulls it aboard by the string, hand over hand. Before seizing the bird the fisherman dons a mask to protect him from any sudden thrust from that needle-like bill. Then, grasping the cormorant, he strips its throat of its contents, depositing the fish in the boat and tossing the bird overboard again. When

sufficient fish are collected, the cormorant is treated to a few, and the fisherman journeys to market with the remainder of his catch.

Although this form of fishing is undertaken nowhere but in the East, it is a sport that any one can take part in if he will take the trouble of catching and taming a young cormorant. A pelican would doubtless prove more productive of excitement, if it could be trained to return to the fisherman the moment the fish becomes locked in its pouch. This bird plunges upon its prey from the air and would have to be taught to return to some sort of lure. It would be amusing to make the trial.

Thus far none of the sports mentioned above have gained a foothold in the United States. Experiments have been carried on with the sharp-shin and Cooper's hawk with promising results, and there is little doubt that these birds will prove as tractable as the Old World sparrow-hawk. We have also our own peregrine and goshawk, with the pigeon-hawk to take the place of the merlin. Falconry is well worth a serious trial.

CHAPTER VII

BIRDS TRAINED TO PERFORM

- 1. Song-Birds.**
- 2. Talking Birds.**
- 3. Birds That Give Warning of Danger.**
- 4. Birds as Decoys.**

1

Song-Birds

Birds taught to execute some little trick or song have, since the dawn of civilization, taken the position of favored household pets. Mere tame-ness, although tolerated because of the attractive disposition of the bird, or beautiful coloring, or the fact that it gives the trainer a complacent feeling of having conquered a wild creature by kindness, does not lead to violent enthusiasm for the bird. What is most fancied is one which, like a bullfinch, can whistle "Yankee Doodle," or a parrot that will recite the tale of "Old Mother Hubbard," or a crow that performs ludicrous tricks with its bill like the famous bird at the New York Hippodrome. A bird of this sort will be cherished by its owner and proudly exhibited at every chance.

In the same way, a common barn-yard duck means nothing to a duck shooter, but if it has de-

veloped into a first-class caller it will prove his most valuable asset in a ducking-blind. While the beauty of a captive bird may appeal to our esthetic sense, its practical value is measured by its performance.

Most birds, however, when captured and tamed do develop some accomplishment and thus afford an excuse for their taking. These achievements are of many kinds, including singing, talking or mimicking, and acting as barometers of danger and as decoys and hunters. Birds that sing and talk are the ones which are most commonly taken for the cage, and of these the best known are the canaries and parrots.

The canary is a native of the Azores, Madeira, and Canary islands. Early in the sixteenth century it was introduced into Europe by sailors and was received with enthusiasm because of its song. It would be difficult to recognize in the dull-plumaged little finch of those days the forefather of the modern vivid yellow bird. The wild canary is far from beautiful. Above it is dark olive, the only color to be seen being a slight greenish-yellow tint on the rump and breast. The sides of the breast are gray with dark stripes, and beneath it is dirty white.

Despite the low-toned hue of its body, its drab and uninteresting appearance, the exquisite voice of this tiny songster flew straight into the hearts of the people. The bird seemed to thrive in cap-

tivity; once tamed, it easily fell under the spell of domestication. Generations of caged canaries passed. Gradually their primitive coloring began to show a change; yellow replaced the dull olive, gray, and white, and there evolved our vivid-hued songster of to-day.

There now exist thirty or more canary breeds, some of which show as wide dissimilarity from the wild type as our domestic fowl from the jungle-fowl, or a fantail pigeon from a rock-dove. Green, yellow, and cinnamon canaries are common. They are to be found in all shades of orange, and pure whites are not exceptional. Some breeds are mottled, others are streaked above and below with brown or black; several are slim of body and long-legged, and a few are dumpy and short-legged. Many are merely balls of fluff and frills, while others own crests like Jacobin pigeons.

But the breeder's art was not entirely concentrated upon securing variation in form and color. The trainers worked unceasingly upon the voice of the canary and succeeded in adding to its quality. The natural song of the bird, already wildly sweet, has been enriched with new notes. The soft familiar trill which so pleases the ear is a product of man's selection, not of nature's.

The best songsters are now bred in Germany, near St. Andreasburg. When the young cocks have completed their first molt—females do not

sing—they are placed each in a separate cage and left in a partly darkened room. An old bird, known as a "schoolmaster" and selected for his perfect voice, is then introduced into the room so that the youngster, through an inborn instinct for imitation, will learn to copy his song. In place of the schoolmaster, or as his aid, a musical instrument termed a "bird-organ," on which many of the required runs can be produced, is sometimes employed. The bird-organ is used almost entirely in the United States as a means of training, not because it is more efficient than the schoolmasters, but because they were difficult to secure. Germany has a monopoly on the latter just as she once had on the dye industry, and jealously guards them against export. Therefore, although accomplished songsters have been reared in America and other countries, the most unique examples still come from the land of schoolmasters and whistling bullfinches.

The voice of the bullfinch in the wild state is a "clear piping call and a curious little squeaky song" delivered with much vim. It has none of the soft sweetness of the wild canary. But as the bullfinch is a native of German groves and thickets, and easily tamed, the people there have taken it in hand. It does not breed well in captivity; therefore the young birds are caught wild and, being clever imitators, are taught to whistle various tunes. Despite the bullfinch's naturally

138 THE IMPORTANCE OF BIRD LIFE

unmusical voice, it proves to be an excellent performer when trained. Under the impulse of imitation it learns to sing and whistle clearly and sweetly, this ability making it much sought for on the market.

Both these birds—the canary and the bullfinch—are imported into the United States in great numbers, canaries of course greatly predominating. Each bird occupies a small cage about five inches wide by six inches deep and tall. Seven cages are slung on a strip of wood, a unit of seven being known as a "stick" or "row." These are placed in large wooden frames tightly wrapped in canvas for shipment. The fronts of the frames are open, with a canvas curtain draped in such a manner that the birds have sufficient air but cannot see or be frightened by what is going on about them.

Upon reaching their destination, the cages are piled one above the other in great tiers, and the birds graded according to quality of voice. They are then ready for shipping to the retail dealers who sell them to their final owners.

The World War interfered seriously with the importation of foreign song-birds and the trade has fallen off to a large extent. Before the war an annual average of more than 350,000 canaries was introduced into the United States from abroad; now scarcely half that number arrive

each year, and only a thousand or two bullfinches. The trade, however, is slowly reviving. In 1921 several shipments, each of five thousand or more canaries, arrived in New York from various European countries. The prospects of 1922 are even brighter.

Although bullfinches and canaries are by far the finest *trained* song-birds in existence, there is a multitude of untrained cage-birds whose native voices are as sweet. The notes of the moriche oriole have no rival for timbre; the song of the bulbul has caused Persian poets to weep in ecstasy. Without going further into detail, we have the babbler, the European blackbirds, the solitaires of Mexico, the song-thrushes, the nightingales, the sky-larks, the weavers, the Southern troopials, the minas of the East, and an almost inexhaustible list of others, any one of which would make a German "schoolmaster" tremble for his honors and put a "bird-organ" to shame. But these birds are rarities and difficult to procure.

2

Talking Birds

Following close after song-birds in popular praise are those species which can be taught to imitate the human voice. Every person is fa-

140 THE IMPORTANCE OF BIRD LIFE

miliar with parrots and what they are capable of saying; therefore we shall pass lightly over this group.

Three families of parrots are suitable as cage-birds. Of them, those termed true parrots,—including macaws, parrakeets, amazons, gray parrots, and love-birds,—make the aptest pupils. The best pet and most accomplished talker is the gray parrot from Africa, although not greatly superior to the South American amazons in either of these capacities. As sailors' pets the amazons are well known, both in fiction and in true life. Macaws, though noisy beyond reason and mischievous, can be taught to talk clearly, as can a few parrakeets. The sole claim of love-birds to popularity, however, is their affectionate disposition. They are silent.

Cockatoos belong to an entirely different group of parrots, being inhabitants of the East Indies, Australia, and several neighboring islands. Although docile pets they are easily excited, and when that occurs their cries can be heard for miles. It has been rightfully said that they are more fond of screaming than talking. The vocabulary of the average cockatoo consists of a word or two, but once in a while a fair talker will be found among them. As a whole, however, they cannot compare with the amazons, to whom imitation is second nature, and may be classed with the third family of parrots, the lories,

which make excellent pets but will not talk at all.

A native power of mimicry is the essential upon which rests the ability of birds to repeat words of human origin. Their whole training is based on imitation of sound, not of action. Clever body manœuvres played with the wings, feet, or bill are the outcome of a habit instilled in them by the trainer through continuous repetition until the movements have become instinctive. The performing crow at the New York Hippodrome has been taught by repeated trials and an innate love for carrying objects in its bill to catch rubber balls tossed in its direction, a trick that it could not learn by imitation. But, despite a facility in acrobatics, it is impossible to teach a crow to say more than a few words. It is not naturally a clever imitator of sound.

But the power of mimicking is not everything. Although a bird may be *able* to mimic it will not necessarily do so without some inducement. An amazon parrot says, "Polly wants a cracker," first, because it likes to make the sounds, and, secondly, because it has learned to associate the sounds with food. The captive bird quickly learns that it can make capital out of its art of mimicry. Its tendency soon is to imitate the sound of everything that goes on near the cage. It finds that the more it mimics the better care it gets. Then, as time passes, the imitation of the human voice becomes a fast-set

habit. It no longer is coupled with the idea of food. The bird now repeats words freely. Its shrill screeches have been replaced by other sounds. It becomes talkative.

Parrots, however, are not the only birds that can be taught to imitate human speech. The hill minas of southern Asia and the East Indies are equally proficient in the art. These birds, although hardly larger than a thrush, will talk in an extraordinarily strong rich voice, and their enunciation is more perfect than that of the general run of parrots. They are wonderful singers, loquacious imitators of other birds, and altogether are valuable additions to the aviary.

Crows, jackdaws, and magpies are also talkers of more or less distinction. While they never attain the proficiency of parrots, they can say a few words. Gifted magpies have been taught to repeat sentences of considerable length.

3

Birds That Give Warning of Danger

There are certain types of birds which have been utilized by man to warn him of the approach of danger. Among these is the guinea-fowl, which might well be said to take the place of a watch-dog. When disturbed it awakens the neighborhood with a series of piercing, grating calls which jar unpleasantly on the ear and will

arouse the soundest sleeper. Guinea-fowl are often maintained on poultry farms merely for the sake of the protection they afford against night prowlers.

During the World War the pheasants in England developed into fairly responsible sentinels against Zeppelin attacks. The birds seemed particularly sensitive to far-off explosions and a raid generally was heralded by a concerted crowing of cocks. It is even asserted that the crowing sometimes preceded the actual attack by from fifteen minutes to half an hour. When the voices of the pheasants were heard raised in alarm, the air-men looked to their machines and the gunners manned their anti-aircraft pieces.¹

Canaries also are employed to detect danger, though in a very different manner. It has long been recognized that they are about fifteen times as susceptible to the effects of carbon monoxide and other poisonous gases as are human beings. Thus, for generations these birds have proved of the utmost value in mines for detecting the first traces of noxious fumes. During mine disasters they are used by rescuing parties to give warning of renewed danger.

Canaries were utilized in the World War as a part of the equipment of the sappers in their tunneling operations. They saved many lives, usually at the expense of their own, through

¹ Gladstone, "Birds and the War."

their ability to detect subterranean gases. Cages containing the tiny songsters hung in dug-outs and trenches, at any point where the enemy gas might penetrate, and thousands of canaries succumbed in order that the soldiers might live to carry on.

4

Birds as Decoys

The proverb that "a bird in the hand is worth two in the bush" is a truism to the trapper. No one realizes better than he that it is one thing to have a bird already locked in a cage and a wholly different thing to persuade another to enter after it. Thoughts of the same character flash through the brain of the sportsman who crouches gun in hand at the edge of a slough while a flock of teal or black duck whistles by out of gunshot. He is bitterly aware that, but for one thing, several of those birds would have been his; a solemn vow is then and there registered that he will never go duck-shooting again without that valuable article. The failure of his hopes rests upon the lack of live decoy-ducks.

The inestimable worth of decoys for luring water-fowl into snares was early recognized by the ancients, who made a practice of netting ducks in large numbers. Many centuries later, with the entrance of the fowling-piece into the

field of sport, it was learned that decoys were of more importance than ever in the taking of wild-fowl. As the birds grew fewer they became more wary, so wary in fact that the sportsman without decoys to aid him in enticing the ducks within gunshot had about as much chance of obtaining one as the fisherman has of catching a trout on a bare hook.

While shooting was in its infancy, it was the custom to employ only live decoys. But as the sport grew more popular, as the shot-gun improved and became sufficiently cheap for any person to own one, the demand for live decoy-birds increased in proportion. Soon the supply failed to equal the call for them, and thus it happened that wooden images gradually took their place. It is safe to say that now more than 90 per cent. of all duck decoys are products of the manufacturer. On the other hand, so popular has become the shooting of water-fowl and shore-birds, so numerous are the devotees of the sport, and, furthermore, so advantageous to the sportsmen are call-birds, that live decoys are still utilized by tens of thousands.

In the case of shorebirds, such as yellowlegs and black-breasted plover, species which own the most trusting dispositions of all game-birds, only manufactured decoys are resorted to. But this type of game stands in a class by itself. Its dominant instinct, that of gregariousness,

proves its undoing. It flies without hesitation to any group of objects which resemble in any respect its own kindred. The sight of these decoys, together with the imitative whistles of the hidden gunner, seem to arouse in the birds an unquenchable desire for companionship that blinds them to all danger, even the reports of guns and the falling of other members of the flock. The writer has seen large clam-shells and pieces of shingles successfully employed in place of well modeled tin or wooden decoys.

Far more wary are the ducks, geese, and other water-fowl. So deep-seated in them is native suspicion that time and again they will pass by apparently unnoticed the great flock of wooden images thoughtfully arrayed in front of the hidden blind by the hunter. If, however, he has staked out one or two call-ducks on short tethering strings in the midst of the decoys, the suspicions of the wild birds are allayed by their quacks, and they fly in to destruction.

Garrulous drakes are used as call-ducks, generally mallards or black ducks, these being the most easily tamed. They undergo no training before being taken to the blind. A good drake will soon learn its business and refuse to exchange confidences with every passing bird. The caller which quacks at a fish-hawk is not esteemed by the sportsman. He requires a drake which confines its attentions wholly to ducks.

Live decoy-ducks are used principally against members of their own species which otherwise are exceedingly difficult to secure on open water. They are seldom deceived by artificial decoys. Of late years, however, it has become a practice in certain States to bait small shallow ponds and sloughs for black duck and mallard, a trick which the wary birds cannot penetrate. Corn is scattered freely over the bottom and, when the ducks have grown accustomed to congregating there to feed, they are shot from blinds as they arrive.

Live birds are employed almost entirely to assure the ducks that the way is clear, and so successful has this method of slaughter proved that it has been followed by a rapid decrease in the black duck and mallard population. Bags of fifty and sixty birds to the gun are not uncommon on baited pools. Unless it is soon replaced by a more sportsmanlike system of shooting, there will be very few ducks to try it on in the near future.

Another method much in vogue a generation ago and still somewhat used for taking ducks is that employed on a few inland lakes of the Middle West. A small body of water is selected for the purpose, one containing a quantity of natural food which has drawn thither from year to year great hordes of ducks. A post is driven into the mud at the center of the lake and from it,

secured by a pulley, an endless line is run under the water to the shooting-stand on shore. To the line are then fastened a score or more tame ducks by a light string attached to their feet.

The operation of the contrivance is simple. A man on shore pulls the ducks by means of the pulley out toward the center post, where they begin to feed on grain already scattered for them. Not many minutes elapse before their activities attract some passing wild flock which immediately settles around them. The line is now gently manipulated. The tame birds drift slowly toward shore followed by the wild ones. Presently they arrive within gunshot of the blind. The gunners leap to their feet; there is a wild splashing on the water, the wild ducks take wing, and the shooting is on.

Still a further method of decoying water-fowl within reach of the gun is by utilizing tame geese which will fly out to a flock and lead them to the shooting-stand. This is a modern form of sport coming into great popularity along parts of the New England coast where wild geese are still numerous in the shooting season. So fascinating is it that the sportsman often forgets to slay the victims, in his interest in the performance of his trained flock.

The flying of geese is undertaken in somewhat the following fashion: some distance from the shooting-stand, and also at the edge of the estuary,

stands a pen containing perhaps fifty thoroughly domesticated and tame Canada geese. The pen is connected with the stand by a telephone. When the gunners sight a flock of geese which will pass not far away, they at once notify the pen. The domesticated birds are thereupon released by a man stationed there for the purpose. They take wing, and, attaining a considerable height, fly honking noisily to form a junction with the wild flock. A garrulous greeting awaits them, and then, after paying their respects, they head straight for the shooting-stand. The wild geese naturally trail on behind, so that in a moment or two all splash into the water within easy range of the blind.

But the manœuvres of the treacherous fifty are not yet completed. They are hungry. And a few yards to one side of the stand, twenty feet or so back from the water-line, is the spot where they are always fed. What is more, grain should be lying there already scattered, waiting for their crops. Without loss of time the fifty crowd ashore and waddle to the grain, while the timid wild birds remain behind as easy marks for the gunners.

This sport holds a fascination for sportsmen which no other form of shooting sport has ever had. It is unique and spectacular. The tendency is growing among its followers to consider the wild geese which have been drawn into the toils as secondary to the fun of operating and training

150 THE IMPORTANCE OF BIRD LIFE

the tame birds. It is quite possible that geese flying of the future may develop into a non-shooting sport.

Gulls and terns, as well as some other birds, are extraordinarily inquisitive by nature, a failing which in past years has proved a serious adjunct to their downfall. In the dark days when the millinery trade in native bird-skins flourished, market gunners took advantage of this idiosyncrasy to fill their bags. A wounded tern or gull was necessary for the game. It was pegged out on the sand by a string, where its wild flutterings could be seen by passing birds. Before many minutes passed dozens would be hovering curiously over their disabled companion, filling the air with discordant, questioning cries.

This was the psychological moment for the gunner, and he lost no time in acting. The more birds he brought down, the more it seemed would congregate in the vicinity. They paid little or no attention to the sound of gun-fire. Their attention was concentrated only upon the strange sight of their brothers scattered in such disorderly array on the beach. The gunner if he desired could kill a thousand without driving the others away. Generally he was content with a hundred, for those were all he could skin in a day.

Decoy-birds are also utilized in trapping songbirds and hawks. In the case of the latter a shrike, the deadly enemy of all hawks, is some-

times used to give warning of the presence of a bird of prey, which is then lured into a net by the fluttering of a captive pigeon. In India hawks are caught by securing a lure bird behind a net stretched between two posts or trees in such a manner that the hawk cannot get at the bird. While attempting to seize its quarry, the hawk gets tangled in the meshes and is easily taken.

Again, small birds have been employed to entice hawks within reach of a gun, but the method is slow and tedious, and meets with small success. Birds of prey, however, are easily brought within range of the gunner by his tossing the body of a crow or pigeon into the air in such a way that the hawks will be certain to see it. This means is especially effective during the early spring migration, when the birds move in large numbers over narrow air paths.

The writer has seen as many as a dozen hawks brought to ground in this manner in one day. For the best results several dead crows or pigeons are necessary. When the gunner sights a hawk flying in his direction, he begins to toss up the bodies as high as he can, one by one, until the victim has seen them. Then, if the hawk happens to be in a hungry mood, its wings half close and down it swoops in a perfect nose-dive straight for the spot where it has espied its quarry.

By this means all kinds of hawks may be taken—falcons, Cooper's hawks, and even the red-tailed

152 THE IMPORTANCE OF BIRD LIFE

or red-shouldered species. The hunter therefore should be able to discriminate between harmful and beneficial varieties before he undertakes to use a gun.

Still another, and perhaps more successful, though less thrilling, method of securing birds of prey—and crows as well—is by the use of a stuffed owl fixed on a pole. The wings of the dummy work on hinges, allowing them to be moved by the pull of a string. The flapping kindles the ire of the birds of passage, who universally detest an owl, and they dive down to wreak their vengeance upon it.

The stuffed owl is often used to entice small song-birds upon a tree branch covered with limed sticks. The little songsters hate an owl as keenly as do all larger birds and in daylight will crowd around it, loudly giving voice to their displeasure at its presence in their domain. Twigs smeared with bird-lime are placed near the owl, and when a bird touches one the twig adheres to its feathers. Both bird and twig fall to the ground where they can be picked up by the bird-catcher.

But song-birds are more often taken in trap-cages in which have been placed live decoy-birds. The cages are constructed of small-mesh wire netting and are composed of three or four compartments. The compartments on either end are fitted on top with spring doors which snap shut when the specially constructed triggers inside are

released. The call-bird is deposited in the center compartment.

The cage is then suspended from a branch in a likely spot. The spring doors on top are opened and the triggers set and baited. The triggers consist merely of perches which will be dislodged from a catch-notch by the weight of a bird alighting upon them. Several wild birds, observing what they believe is one of their number in trouble, soon congregate about and upon the cage. The call-bird shows signs of excitement, calling and fluttering. The wild birds become equally excited. Their curiosity is aroused. The call-bird begins to peck at the food in its compartment and the outsiders are eager to follow suit. One ventures through an open door, alighting full upon the trigger. A "snap" follows, and the cage has one more prisoner.

These are only a few ways in which birds are utilized as decoys to lure members of their own tribe to captivity or destruction. Every nation has its methods, as have all half-civilized or savage peoples.

CHAPTER VIII

ORNAMENTAL PLUMES

1. Feather Structure.
2. The Rise of Ornamental Plumes.
3. Plume Hunters.
4. The Fall of Ornamental Plumes.

1

Feather Structure

The most outstanding feature of the bird is its feathers. They are its inheritance, the unique indisputable badge of the avian class. Like the fur of a mammal, they act as a body covering to aid in the maintenance of an even body temperature, so essential to all warm-blooded creatures. They are insulators against heat and cold, neutralizers of climate and elements.

Several million years have passed since the leathery scales of some long-extinct reptile began to develop a plumose character. Those specialized scales finally altered into what we term feathers, a change which took place at a time of which we have no record. The only trace of a pre-feathered condition is now found in the early embryo, a replica of which is also seen in the embryo of an alligator. If we had no proof of their origin it would be difficult to believe that such

highly complicated structures could have evolved from a section of tough horny integument.

For the purpose of analysis let us take an ordinary feather—a primary—from the wing. On close inspection we discover that it is composed, so to speak, of five different units. The basal portion—the hollow transparent stem—is termed the “calamus” or barrel. The opaque shaft (vane), or “rachis,” runs as a continuation of this to the tip. The “feathering” branches out from the shaft on two not quite opposite sides in numerous lateral shoots. These are designated as barbs or “rami.” They appear to the naked eye to be long, flat, narrow, and solid, like the petal of a daisy, and they radiate diagonally from the shaft, one above the other. But a glance through a microscope shows each barb to be a miniature feather, with shaft and tiny lateral filaments of its own, resembling the plumed antennæ of a *Cecropia* moth. The lateral filaments, termed “barbules,” interlock with the barbs above and below them, being fringed with a series of minute hooks, or “barbicels,” which act as fasteners. Thus, a tight, compact web is formed, giving the strength to the feather necessary to enable it to resist the pressure of the air.

If a split occurs in the webbing, as often happens when the bird is alive, a few strokes of the bill serve to readjust the barbicels so that they will renew the grip they have lost. A person also

156 THE IMPORTANCE OF BIRD LIFE

can make good such a gap by delicately manipulating the separated barbs until the hooks have once more caught. It is thus possible to mend a very ruined-looking quill.

The external body feathers of a bird, including those of the wing and tail, are as a rule "normal" in character. They produce the quills and downs employed in the upholstery trade. There is a very wide variation between them, however, and some are the reverse of normal. In some species the feathers, where their tips have been exposed to the light and outer air, are waxy at the end as if they had been dipped into colored paraffin. The plumes of the ostrich, bird of paradise, and innumerable others, lack a sufficiency of hooked barbules to give them firmness and therefore are filmy or downy in character. In the penguin the wing feathers are really bristle-like scales, and in the wingless *Apteryx* of New Zealand the body feathers resemble hair. And the nuptial plumes of the famous egret are merely delicate shafts with a sparse scattering of long hair-like barbs. The majority of birds, however, have not exceeded the "normal" requirements of nature.

Aside from these body—or "contour"—and flight feathers, there are two unimportant kinds still to be found on the average bird. The "filoplumes" arise as a scattering of long hair-like filaments beneath the main body covering. They are the "hairs" which the cook-books demand be

singed off a fowl before cooking. Also beneath the contours lie the so-called "downs." These must not be confused with the commercial downs, which consist generally of the normal feathers of the breast. The body downs have no shaft and are of no further importance here.

It also is quite unnecessary to list all the gorgeous colors and tints that are assumed by feathers. They are to be found in a study of the spectrum.

While all feathers contain pigment, it does not follow that all bright-colored feathers are filled with *brilliant* pigment. On the contrary, dull-pigmented feathers are sometimes of the most vivid hue. The basic coloring matter does not always show; for instance, the deep green of a parrot may have gray or yellow as its foundation.

There are three sources of feather coloring. The first and most general is the direct transmission of hue from the pigment originally absorbed by the young feather during its growth. In other words, these feathers may be red, owing to red pigment, or black because of black pigment. In this list come reds, blacks, browns, and some yellows and oranges, but rarely green and never blue or the metallic tints. These last are all chemically composed and may be extracted by means of reagents.

The next type of coloring arises from a combination of pigment with certain structural varia-

158 THE IMPORTANCE OF BIRD LIFE

tions in the surface of the feather. The variations consist of minute furrows and ridges so arranged as to reflect light and thus alter the true tint of the feather. Purples and blues fall within this class, and generally green, though seldom yellow. By eradicating these physical irregularities through soaking in water, the basic color is brought out; but the feather will regain its abnormal hue when dried.

The third type is found in the iridescent metallic tints. These beautiful shades are entirely dependent upon the structure of the feather, and pigment, save as a mirror for reflecting light, is in no way concerned. In humming-birds, peacocks, and starlings,—birds whose feathers *appear* bright but basically are not,—the body feathers are covered with tiny ridges, knobs, pits, and excrescences, which tend to dissolve light into its component parts. Added to these are reflecting pigmented plates so arranged as to give forth only prismatic rays. The entire combination thus gives to the birds those delicate sheens so peculiar and beautiful.

The Rise of Ornamental Plumes

Ever since man first became a thinking being he has fought a victorious battle with wild and savage beasts. Because of his superior cunning

he obtained from them, first food, then their skins as clothing. Throughout the severe winters he utilized the pelts of fur-bearing animals to keep him warm. Where beasts were scarce and sea-birds plentiful, he used the skins of the latter.

This use of bird skins has continued down to the present day. The Indians and Eskimos of northern Canada, Greenland, and Alaska, the natives of Nova Zembla, and the wild tribes of upper Siberia slaughter the close-feathered auks, guillemots, murres, and puffins by the thousand for this purpose alone. So important are the skins considered for clothing that a special clause has been inserted in the international migratory bird treaty between Canada and the United States making the natives immune from the law in this respect. The Indians also are inordinately fond of decorating themselves and their weapons with bright-colored or striking-looking feathers, a habit not peculiar to them alone but followed by most uncivilized peoples.

The war on birds for their ornamental plumes was well under way before the dawn of civilization. There can be no doubt that such an artistic people as the early wall-painting Cromagnards must have had a love for body adornment as well as for highly pigmented pictures. These ornaments must naturally have been the gay-colored feathers and plumes of birds. The later neolithic men had a culture resembling that of many of our

modern savage tribes. Therefore, they too must have loved feather ornaments.

Feathers are a too important item in the every-day life of a savage to be thought lightly of by him. They are, above all, necessary to guide arrows straight. They may be incorporated into head-dresses, totems, ju-ju, tokens, medicine, darts, necklaces, charms, trinkets, toys, and feather robes. They are his jewelry, his hand-wrought lace, and his tapestry all in one. As his culture broadens he becomes more skilled in their working. Thus the art of weaving feathers into brilliant tinted robes had reached a high level in Central and South America during the time of the Aztecs and Incas, while the robes of Hawaii and the Far East have never been equalled in beauty anywhere.

But in Europe, with the coming of civilization, the esthetic value of feathers seems to have been forgotten until about the thirteenth century. In England they were first seen on the queer conical hats worn during the reigns of Edward III and Richard II. Later,—about the time of Henry V,—they were initiated as a part of the military costume in the form of hat plumes. The custom of wearing plumes then rapidly spread to the populace, and by the end of the fifteenth century so great was the demand for plumes that the milliners had difficulty in maintaining the supply. At that date enormous prices were demanded for

the better types of ostrich-feathers and fabulous sums were paid for other plumes.

Until the reign of Henry VIII feathers for ornamental purposes had been worn by men only, but now they began to appear in the head-gear of women. Under Elizabeth they became a fixed feminine fashion, a fact which caused their immediate wane as a component of masculine attire. So quickly did the wearing of feathers by men die out that by the close of the next reign plumes were relegated to the military only. Henceforth they were to be worn by women even down to the present day.

3

Plume Hunters

Feathers to be used for ornamental purposes must be smooth, clean, and fresh-looking. They must be secured from the bird before sufficient time has elapsed to become frayed and worn by continued usage; in other words, feathers should be taken shortly after the bird has completed its molt. Some birds molt twice a year, others only once, but, whichever may be the case, the brightest plumage is assumed during the mating season. Most plumes, then, are secured when the bird has a nest—a fact which gives rise to high mortality among the young of the species through starvation and a wholesale destruction of eggs.

Before discussing plume hunters and their methods, however, it would be advisable to become familiar with the objects of their search—plumes and skins. The word “plume” we shall take in its broadest generic sense to cover all bright, large, and fanciful-shaped feathers whose individual beauty warrants their being used singly to adorn a hat or gown. Such plumes then may be the long scarlet or blue tail-feathers of the macaws; the emerald tail of the quetzal trogon; the wing- or tail-feathers of any large hawk, eagle, or vulture; the silky plumes of the bird of paradise, the ostrich, or rhea; the smoky tufts of the egret; or the embroidered crests of the crowned pigeon. They may be assumed in the mating season by the males to react upon the esthetic sensibilities of the females, or they may be worn by both sexes alike; it does not matter which. That they have elegance, grace, and beauty which will attract the eye of Fashion, is all that the plume hunter desires.

Commercial skins as a rule are taken from small birds which will appear decorative on a hat or in a glass case when stuffed. To be of the desired sort they must be a mass of vivid color, or snow-white or jet-black. Within this list fall the gulls, terns, grebes, fruit pigeons, kingfishers, parrots, hummingbirds, trogons, jacamars, sunbirds, toucans, larks, thrushes, wrens, orioles, honey-creepers, troupials, and tanagers. Thus it

can be seen that virtually all birds come in one way or another under the scope of the hunter of plumage.

Up to the nineteenth century the bulk of collecting was undertaken by the natives of the regions where the birds make their homes. Although the growth of their population was held in check, no species were exterminated. The traps, the blow-pipes, and the arrows of the natives, while deadly, were not all-conquering, and the plumage birds held their own in numbers.

Then annual fashions became an institution in the civilized world. During the nineteenth century the white races increased tremendously in population both in Europe and America. Businesses multiplied and people grew rich. As they obtained more money fashion began to mean more and more to the "unfashionable" public. And fashion declared that feathers should be worn. The cry was raised that there were not enough plumes to go around. Then it was that "civilized" men took up the hunt.

When the white hunter took the field great rookeries remained all over the world, untouched as yet save for periodical attacks by a few ill-armed savages. These colonies were the first to suffer at the hands of the new professional plume hunter. Armed with rapid-fire breech-loading shot-guns he proceeded to his work. No thought of a future birdless world entered his mind. The

164 THE IMPORTANCE OF BIRD LIFE

plumes were easy to obtain; rookeries of ten thousand gulls or egrets could be exterminated in a single season—and were. The hunter entered India, Borneo, South America, Africa, everywhere, and ruthlessly left a trail of dead behind him. The natives, encouraged by his example, increased their own activities. Plume hunting paid well, and all collectors grew rich.

But the hunter was not satisfied merely with the ravaging of the out-of-the-way places of the earth. The market demands for bright feathers were daily growing. Prices were high. He invaded his own home territory. Europe and the United States became a slaughter ground for their native birds.

No country in the world was exempt from the ravages of the trade. Employment was afforded to thousands of men. Several thousand were at the work of slaughter in America alone.

On one occasion fifty boats filled with collectors were observed in the harbor of New York in a single day busy shooting gulls and terns. A man on Long Island killed eleven thousand terns in one season. Seventy thousand skins were shipped to New York from that island in four months. The gull colony of Cobbs Island, Virginia, was virtually exterminated. Fifty-five *million* birds were slaughtered for millinery purposes in the United States in one season—a bird for every two persons now living in this country! And the

slaughter continued without abatement for many years!

The European markets are still glutted with plumes and skins, although most countries forbid the killing of their own birds for this purpose. Before the war England alone imported more than thirty-five million skins a year. A single invoice of hummingbird skins from South America has totaled as high as four hundred thousand. In 1895, upward of seven hundred and fifty thousand plumes of egrets and birds of paradise were sold from a single London warehouse. Sixteen years later, not because the demand was less but because the wild birds were becoming scarce, only one hundred and fifty thousand of these plumes were sold in that city by the four leading feather dealers. Virtually all the countries in the world, save those in Europe and America, sent their wares to the London market.

IMPORTS OF FEATHERS AND DOWN 'ORNAMENTAL) FOR THE YEAR 1910¹

	Pounds	Value
Venezuela	8,398	\$ 191,058
Brazil	787	5,999
Japan	2,284	3,830
China	6,329	16,308
Tripoli	345	900

¹ Hornaday, "Our Vanishing Wild Life."

166 THE IMPORTANCE OF BIRD LIFE

Egypt	21,047	89,486
Java, Sumatra, and		
Borneo	15,703	" 186,504
Cape of Good Hope		
(chiefly ostrich)	709,406	9,747,146
British India	18,359	22,137
Hong-Kong	310	3,090
British West Indies	30	97
Other British Colonies ..	10,438	21,938
Total	<hr/> 793,436	\$10,288,493

The means by which the hunters secured their victims were in most cases inhuman and revoltingly cruel. Picture, for instance, a small sandy islet scattered over with thousands of nesting gulls. Every few feet there is a small depression in the sand in which lie two heavily marked eggs or a pair of nestlings, little speckled puffs of down. The feather hunter arrives. Pleased that the gulls are nesting and therefore will be easy to kill, he goes to work. Two weeks later there is not a living thing in sight. The young are dead,—starved,—the eggs are addled, and the islet is a desert of bones.

For proof that such a picture is not a figment of imagination, we can take the tragedy of Laysan Island, which occurred in 1909. This island, a tiny sand patch scarcely two miles long in the heart of the Pacific Ocean, had been for centuries a paradise for the albatross. There the birds

bred in tens of thousands, crowded as close as they comfortably could, and there they still were when the feather seeking expedition arrived from Honolulu in the spring of 1909. For several months the slaughter continued until a stop was put to it by the United States revenue-cutter *Thetis*. But the cutter arrived almost too late; more than half the birds on the island had been killed. Three hundred thousand albatrosses, gulls, terns, and other birds had already been butchered. Lay-san Island was indeed a desert of bones.

And the ruthless methods of slaughter are not confined to sea-birds. It is the custom to shoot the graceful egrets as they approach their nests. As the birds skitter helplessly to earth they are seized by the hunters, who tear the patches of skin holding the lacy plumes from their backs before the birds have expired. The youngsters are left to starve in their nests without any attention.

The crowned pigeons of the Papuan and Solomon islands, from the heads of which come the commercial goura crests, meet with a similar and if possible more brutal fate. These birds are mainly terrestrial in habit and are poor fliers. Instead of guns, their slayers employ clubs. The birds are beaten into insensibility and their crests torn from their heads while they still breathe; they are scalped and left to revive if they can.

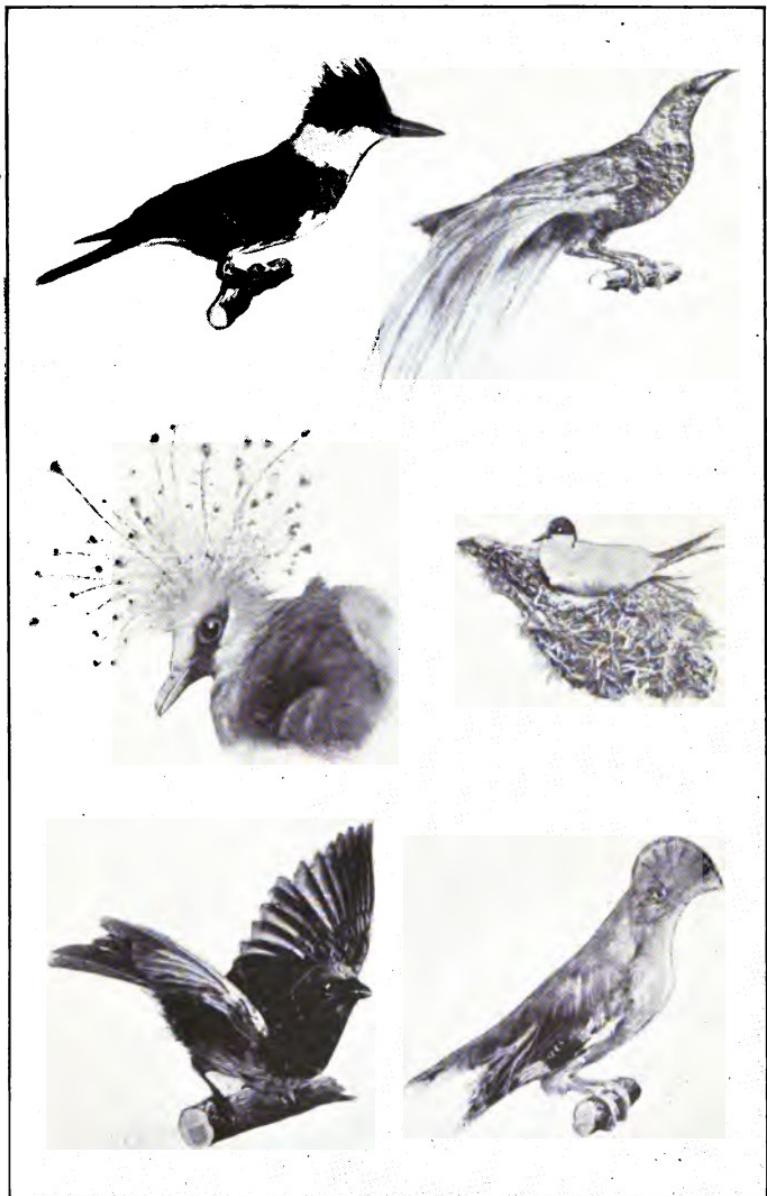
Birds of paradise have a better chance to sur-

vive than the others. The plumes, at their best in the breeding season, are worn only by the males. The females therefore go unmolested and may rear their young if they can do so alone. But the demands of fashion have been heavy in the past, and even of these birds several species have become extinct.

Ostriches likewise were hunted down and their numbers thinned to the verge of extermination for the sake of their plumes. An end, however, was put to the slaughter by the discovery, about the middle of the last century, that they would respond to domestication. On the other hand, their American cousins, the rheas, have been less fortunate; their extinction is now in sight because they have not the amenability of the ostrich in captivity. Thousands annually are killed for their small plumes, and huge stores of feathers, baled and ready for shipment, accumulated in the warehouses of Buenos Aires during the late war.

Again, high up in the Andes, it is still a practice to catch great condors—the largest birds that fly—in nets. The wing and tail quills are pulled, together with a few soft feathers from around the neck, and the bodies are tossed aside to rot. It is said that condors are now becoming scarce.

The same fate has attended a thousand other species whose bright colors or graceful plumes have fallen under the eye of the professional



From "Our Vanishing Wild Life"

ALMOST EXTERMINATED FOR THE PLUMAGE TRADE

BELTED KINGFISHER
VICTORIA CROWNED PIGEON
SUPERB CALLISTE

GREATER BIRD OF PARADISE
COMMON TERN
COCK OF THE ROCK

feather seeker. They too have grown scarce. Will all birds thus fall victim to fashion?

4

The Fall of Ornamental Plumes

Once upon a time an ancient Mexican people built great cities and lined them with gold. They lived in the radiance of countless jewels, enamoured of splendor and display. Then came an army of stronger fighters, whose greed had been aroused by sight of all this magnificence, and the ancient race was defeated, enslaved, and well-nigh exterminated. As with the Aztecs, so it has been with the birds. Their beauty has aroused the greed of mankind, and they have suffered in consequence.

But their suffering is drawing to a close. Men, before it was too late, suddenly realized the worth of what was being destroyed. A change of heart came over the civilized world. Protection instead of destruction is now the popular slogan.

Forty-odd years ago the American Ornithologists' Union and the United States Department of Agriculture opened a campaign against the feather trade. The struggle bade fair to be a bitter one. Scarcely a soul in this great population of ours seemed to realize that a few more years of promiscuous slaughter would see the

170 THE IMPORTANCE OF BIRD LIFE

final extermination of all our birds. The A. O. U. and the Agricultural Department threw themselves into the breach with the fury of despair.

In 1886 the Ornithologists' Union, which was composed of men who had spent their lives studying and compiling statistics on the actual monetary value of birds, drew up an outline for a law which would deal with the protection of native birds. This was submitted to the various States for ratification. Until that time each State had had a code of its own to limit the shooting seasons, but that was as far as they had gone. There had been no attempt anywhere to differentiate scientifically between the game and non-game birds. What was called a song-bird in one State might be called a game-bird in another. Neither class had any universal specific grouping. This was the condition that the A. O. U. strove to rectify.

The Audubon Law, as it was called, laid down by the ornithologists, gave the birds a correct rating as seen from a scientific point of view, and offered a closed season on all species that could not be considered true game-birds. The law was immediately adopted by New York and Massachusetts, in the year it was drafted; but so slow were the majority of the people in the United States in grasping its significance that twenty-three years had passed before the remainder of the States had acted upon it.

The effect of the new law on birds at once be-

came manifest in the two States which had adopted it. Long Island, instead of remaining a general slaughter-house for sea-birds, resolved itself into a gigantic bird reservation. Although in past years gulls and terns had been virtually extirpated from its coasts, they began once more to appear in great numbers. In Massachusetts the report of the milliner's gun was no longer heard. The song-birds lived in peace. They thrived and multiplied.

But there was one great weakness to the new State laws. They did not prohibit the importation of feathers secured abroad or *within the borders of other States*. Thus, despite the advanced code of her own State, New York City still was the leading center of the plumage traffic in America! In the late nineties the feather trade reached its high level in that city. It was being fed from the rookeries of Florida, Virginia, and the Carolinas, and, unless those States prohibited the slaughter and export of their birds, nothing more could be done about it.

In response to calls for help from the A. O. U. and the Department of Agriculture, bird protective associations, known as Audubon Societies, were organized throughout the country. Under the direction of their founder, William Dutcher, the National Association of Audubon Societies fought a stubborn battle with the common enemy, the feather dealers. The latter, under the guise

172 THE IMPORTANCE OF BIRD LIFE

of the Millinery Association, fought just as stubbornly to preserve what they considered their rights.

The struggle swayed back and forth with minor victories on both sides. Amendments and counter-amendments were submitted to the various State legislatures and even to Congress. Investigation followed investigation. The lobbyists had full innings.

Then the protective societies hit upon the plan which finally brought permanent victory to their banner. A campaign of education was begun. The people for the first time heard the story of the plume hunters. Newspapers took up the cry; the Department of Agriculture issued bulletins; and thousands of instructive pamphlets were printed and spread broadcast by the Audubon Societies. The public was made to realize at last that every tern, every aigret, and every pair of wings worn for the sake of adornment had cost some bird its life.

The question of feathers to be worn in hats became a public one. Popular indignation once aroused against the feather trade, there was nothing left for the State legislatures to do except act. This was what the protective societies had aimed for. Many native birds which hitherto had been neglected by the law suddenly found themselves on the protected list. States enacted laws prohibiting the killing of birds for their plumage.

Gradually they accepted the Audubon Law, and our native birds took a new lease on life.

The blow to the milliners was heavy, but they stubbornly maintained the battle. The continuous flow of skins was interrupted, it was thought, but not disrupted. The future would show. Some States still permitted plume hunting. The new law in others would soon be repealed. But it was not. Instead, in 1900, the Lacy Act passed Congress and became a national law. By it, the transportation from State to State of the skins and plumes so necessary to the dealers was forbidden. The dealers capitulated. The war within the United States was over.

Although defeated in one direction, the Millinery Association was not yet ready to cry quits. There still remained the import trade from outside of the United States. If our native birds could not be destroyed, then all others must suffer in consequence. The demand for gouras, birds of paradise, egrets, and all foreign birds increased. Hundreds of thousands were brought from the East and millions of skins from South America.

The protectionists, having gained the victory for their own birds, extended their efforts to preserve the foreign species. Their campaign of propaganda and efforts toward legislation were continued without let-up. The cause now was for world-wide humanitarianism where birds were concerned. And after thirteen years they were

174 THE IMPORTANCE OF BIRD LIFE

again greeted with victory. Congress, in 1913, enacted a tariff act prohibiting the importation into the United States of any skin, plume, or plumage for millinery purposes except from birds reared in domestication.

When they discovered that there was no way to combat the tariff, the Millinery Association gracefully accepted defeat. Thereafter they arraigned themselves on the side of protection. From that day to this they have strictly upheld the law. Through their own efforts several flagrant cases of smuggling have been prosecuted. During the feather war they had claimed that the loss of the trade would throw several thousand operatives out of employment. With the passage of the law, however, the operatives began to manufacture *artificial* feathers. The new industry is now in a flourishing state, well protected because of the tariff.

As might be surmised, there has been a large amount of smuggling of forbidden plumes since 1913. As many as 1000 paradise plumes have been seized in one shipment. Certain unprincipled milliners have dealt largely in contraband feathers, protected by a law which does not force them to prove that the plumes were obtained before 1913. Under the new tariff of 1922, however, the burden of proof is thrown entirely upon the dealer. These discreet men are now selling their plumes for whatever they can get. Bird

of paradise plumes and gouras are going for a mere song, and soon they will be gone from our markets for ever.

In Great Britain the feather war was even more fiercely contested than in America, and was more protracted. Canada had followed the example of the United States in 1914, but the milliners of England were more stubborn. For the last twenty years a bill forbidding the importation of skins or parts of skins for millinery purposes was annually submitted to the House of Commons. And each year it met with such organized opposition that it was voted down. Both parties employed extensive propaganda and the conflict proved bitter. At last, however, a Plumage Bill was forced through in 1921, which created a committee to pass upon imported plumes. The first work of the committee was to prohibit the bringing in of virtually all feathers, and now the plumage trade of Great Britain is almost at a standstill.

With the great feather markets of England and America closed to them, the business of plume hunting is drawing to a rapid close. It no longer is a profitable profession. When France withdraws from the market, as she is expected soon to do, the collectors will lay down their guns once for all. But, even as the market stands to-day, birds as a whole are assured of survival.

CHAPTER IX

FEATHER INDUSTRIES

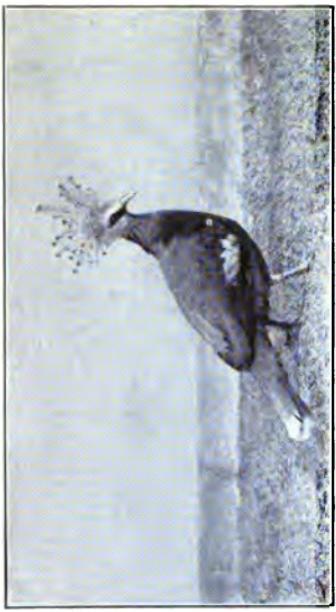
- 1. Ostrich Farming.**
- 2. Manufacture of Ostrich Plumes.**
- 3. Non-existence of Egret Farms.**
- 4. Commercial Downs and Their Uses.**
- 5. Minor Feather Industries.**

Ostrich Farming

1

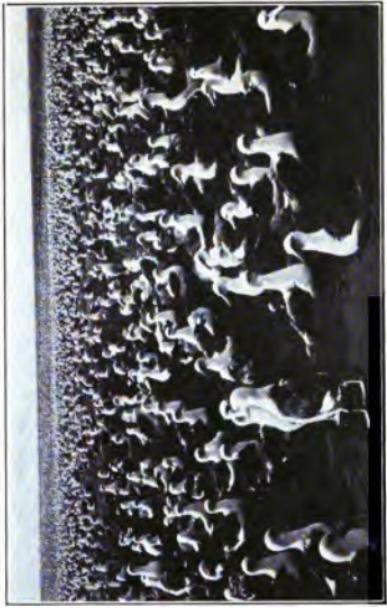
No attempt was made to domesticate the African ostrich before the middle of the last century. The birds had been hunted for their plumes from immemorial time, captured and killed by every conceivable means, but no man dreamed that they could be reduced to a domestic state.

Although the ostrich had once been a native of western Asia as well as Africa, it had been exterminated in the former region before the beginning of the Christian era. The early Egyptians utilized its plumes in much the same way in which we use them to-day. Ostrich eggs have supplied food for countless thousands of African natives. These natives made head-dresses from the feathers of the bird. The markets of Europe demanded thousands of plumes. Dressed in os-



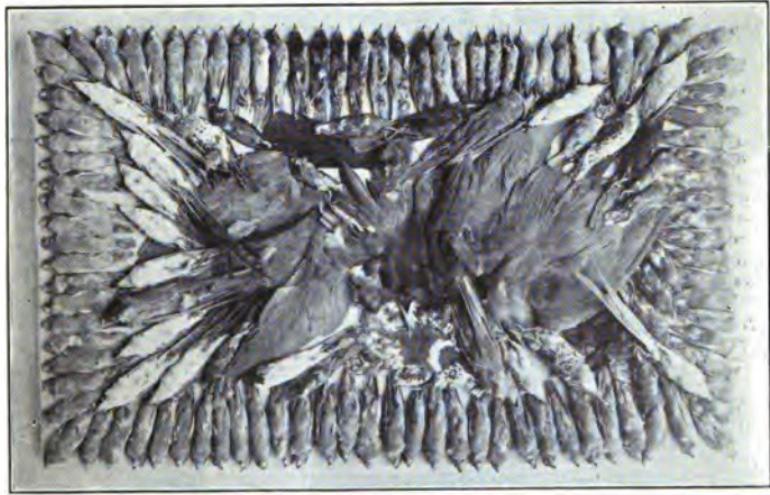
Courtesy of the
N. Y. Zoological Society
Photograph by
Elwin R. Sanborn

VICTORIA CROWNED PIGEON, THE BIRD WHICH IS SCALPED FOR
ITS LACY PLUMES



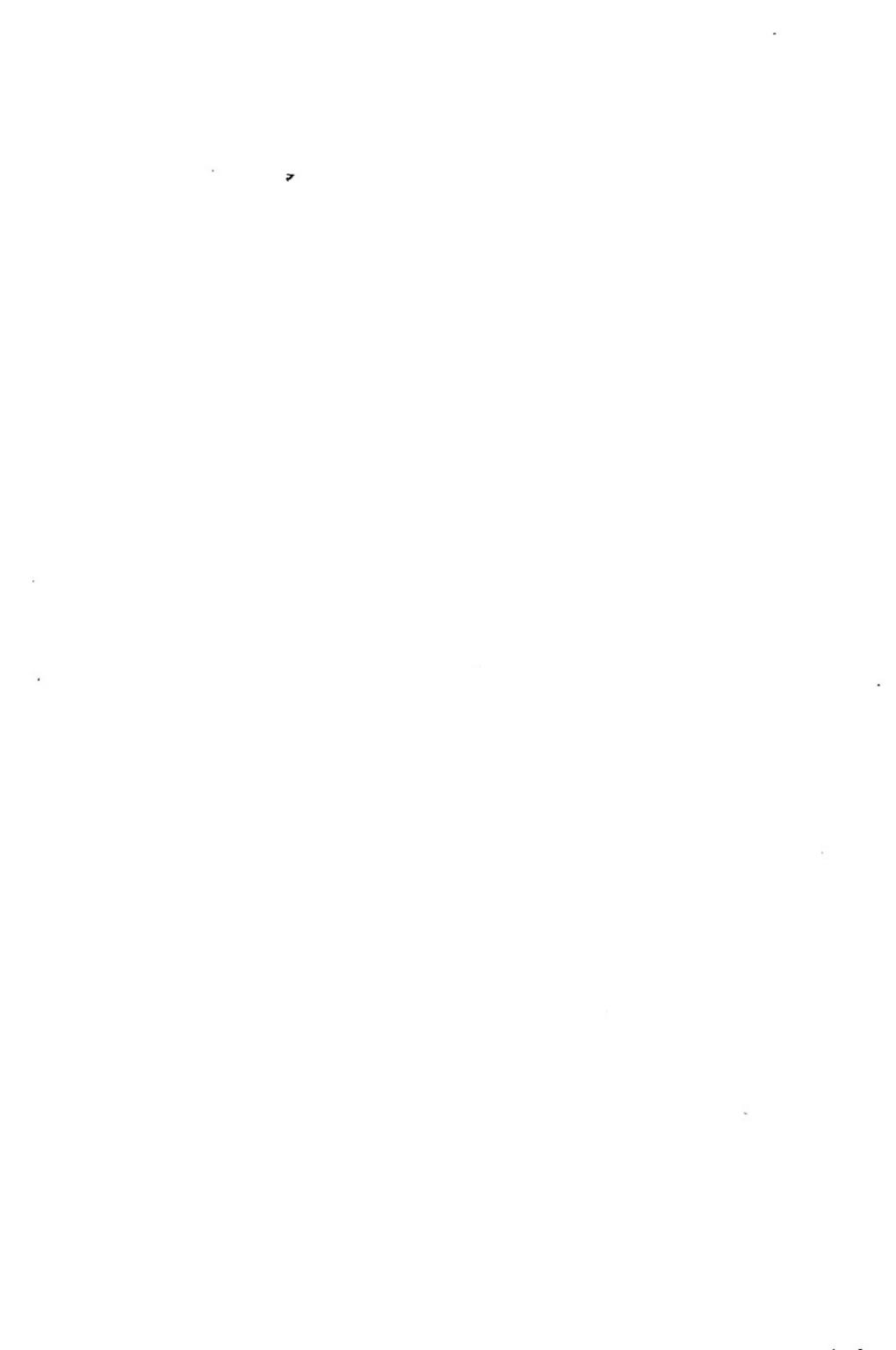
Courtesy of Dr. W. T. Hornaday

ALBATROSSES OF LAYSAN ISLAND BEFORE THE TRAGEDY THE
PLAIN LATER WAS A DESERT OF BONES



Courtesy of Dr. W. T. Hornaday
BOUGHT IN LONDON, 1912





trich skins, the natives stalked the birds, and slew them with poison-tipped arrows. They were snared and trapped, and ridden down on horseback. And as a result they became wary, scarce, and difficult to secure.

The natives were able to obtain enough plumes for their own use, but Europe went begging. As the supply decreased, the price of ostrich-feathers soared to unheard-of heights. White men took up the profession of ostrich hunting, but met with indifferent success. The European world was faced with a famine in plumes. Then it was that a Dutch settler in South Africa made the discovery that ostriches could be bred on a commercial scale in captivity.

The first serious attempt to tame the birds took place in 1863, but several years elapsed before eggs could be hatched and chicks reared under the care of man. Once the fact was established, however, that such a thing was possible, ostrich farming took a boom. The value of plumes was higher than ever.

The rearing of ostriches soon became a recognized industry of South Africa. Great sums of money began to be realized and many Boer farmers grew rich. Within twenty years after the first birds had been domesticated there were nearly a third of a million of them in the colony. By 1913 the number of ostriches had risen to approximately nine hundred thousand, with an an-

178 THE IMPORTANCE OF BIRD LIFE

nual production of a million pounds of feathers, worth roughly \$13,500,000.

In many respects ostrich farming resembles poultry raising. The eggs are incubated by one of two systems, officially termed "natural" or "artificial." In the former method, as implied by its name, the eggs are hatched by the birds themselves, just as they are in the wild state. The nest consists of a large depression in the ground scooped out by the breast-bone of the bird. Its construction is simple. The ostrich merely squats down, with its breast thrust forward, and revolves slowly until a hollow of the required size is formed. The female then lays an egg every other day until the clutch of twelve or fourteen is complete. The eggs are heavy and large, averaging about three and a half pounds apiece, and their contents are equivalent to about thirty chicken eggs. The male performs almost the entire duty of incubation. If the sun is very hot the eggs are often left covered during the day with a thin layer of sand; if the weather is inauspicious the female rests upon the eggs from nine in the morning to five in the afternoon—not a minute longer. The male sits regularly for the remaining sixteen hours of the twenty-four.

But the natural method of hatching eggs is not the most economical, and has virtually everywhere been displaced by the artificial, or incubator, system. The ostriches are allowed to excavate a nest

and deposit their eggs there. As fast as the eggs arrive they are removed from the nest, a proceeding which causes the bird to lay steadily until perhaps fifty, sixty, or even one hundred eggs have been produced, instead of the normal baker's dozen. The eggs are then enclosed in specially constructed incubators and maintained at a temperature of 99 to 100° F. for a period extending over forty-two days.

The chicks are already the size of ordinary domestic fowls when they emerge from their thick shells; their grayish bodies are mottled with dark spots. Growth is rapid,—nearly one foot in height a month,—and when adult size is reached their heads will rear seven or eight feet from the ground. By that time they weigh three or four hundred pounds. At four years of age they commence to breed.

Commercial ostrich-plumes are those feathers which sprout from the tail and the misshapen wings. Each wing produces forty-two major quills, a number which is never exceeded, though many attempts have been made to increase it by artificial selection. Plucking commences when the birds are six months old. The feathers then are of an inferior quality, small, and termed "spadonas" from their spear shape. It is the practice in South Africa to clip the birds every six months thereafter, both sexes producing plumes.

At plucking time the ostrich is driven into a

V-shaped pen, where a hood is slipped over its head. The sudden darkness produces a docility in the bird, which may then be handled with impunity, without fear of a vicious kick from one of its powerful limbs. Each plume is separately examined, and those wholly opened out are clipped off with a pair of shears, leaving the quill stubs embedded in the flesh. Any young feathers not fully unfolded, or in which the blood still flows, are not touched. If by chance they should be clipped, the fresh feathers which later replace them will most likely be deformed, a condition not at all desirable.

The operation of plucking is entirely without pain to the ostrich: no arteries are severed, no nerve is injured; the dead chitinous barrel of the plume alone suffers. Two months after the operation the quill stubs, now replaced by young blood-feather shoots, may be extracted without the slightest notice being taken by the bird.

South Africa, however, though the original home of the ostrich under domestication, is no longer the sole seat of that industry. Ostrich farming is now practised in many countries; in various parts of Africa, in Argentina, and in the United States. It has met with wide-spread popularity in Egypt and in British and French Nigeria, and the Sudanese are learning more modern methods. For centuries the Sudanese have reared wild caught chicks, but until recently they have made no at-

tempt to breed the birds in captivity. The Argentine farms have brought wealth to their owners, and for a time the American farms were prosperous.

Twenty-two ostriches were introduced into California from Cape Town in 1882, to form a nucleus for the industry in the United States. Forty-four more arrived in 1890, and later—in 1901—twelve Nubian birds. From these seventy-eight birds, then, came virtually the entire American stock of several thousand.

Success followed the first attempts at breeding. Within a few years thriving farms had been established in California, Arizona, Arkansas, North Carolina, and Florida. By 1910 there were approximately 6100 breeding ostriches in the United States. Of these about 80 per cent. were owned in Arizona, 17 per cent. in California, 2 per cent. in Arkansas, and the remainder in the other States. A breeding pair at that time was worth from \$700 to \$1000, specially fine birds sometimes bringing that much apiece. Young ostriches were less valuable. The market value of plumes varied, but in good years from thirty to fifty dollars' worth of feathers would be produced by one bird, and as high as ninety dollars by exceptional ones.

It is the custom to pluck American ostriches every nine months instead of twice a year as in South Africa. About a pound of feathers is obtained at a clipping. These are roughly sorted

182 THE IMPORTANCE OF BIRD LIFE

on the farm and shipped in bundles of one hundred to the New York market.

2

Manufacture of Ostrich Plumes

Upon arriving at the factory the plume bundles are opened and the feathers are tied by their stems to strings in piquets of three. These piquets undergo washing in ordinary soapsuds, being scrubbed on common scrubbing-boards. When clean they are placed for several hours in a vat of red dye maintained at a temperature of 150° to 180° F. Then, if black plumes are desired, they are immersed in black dye for twenty-four hours.

Dyeing for other colors—pink, orange, light blue, or cardinal—consumes less time—generally not more than an hour. When the proper hue is obtained the piquets are introduced to a drying room where they hang for six hours in a warm temperature. They are next thoroughly threshed out to loosen and soften the webbing. The strings are cut away from the piquets and the feathers are accurately graded according to size. Trimming follows and finally a re-grade as to excellence.

Single feathers are seldom employed as plumes. Only those of the very finest quality can be used alone as such, and they of course fetch the highest prices. The majority of commercial plumes are



Courtesy of Dr. W. T. Hornaday

1050 PLUMES OF THE BIRD OF PARADISE, SEIZED BY THE U. S. CUSTOMS OFFICERS



Courtesy of the
N. Y. Zoological Society

Photograph by
Elwin R. Sanborn

A PAIR OF NUBIANS

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developed from the fragments of several feathers, as great proficiency has been attained in this art by the feather manufacturers. A good feather is selected and the vane is pared down or split in two. Other feathers, similarly treated, are superimposed upon it with their flattened vanes touching. The bundle of shafts are then sewed together at one-inch intervals and "stemmed"; i. e., a wire is sewed in. An average "made" ostrich-plume thus is composed of three or four feathers, five or six being utilized in the manufacture of the best quality.

After the sewing is concluded, the plumes are curled and twisted. The latter process is accomplished by manipulating the feathers in the steam arising from an ordinary kettle. When they harden they will retain their new shape. The curling is done with a pair of curling-irons similar to those used on the hair.

Despite its early prosperity, however, the time came a few years ago when ostrich farming received a severe set-back. The World War broke out in Europe. Fashions began to change and ostrich-feathers fell into disrepute. They were cast aside for simpler styles. Gradually the market weakened, then broke.

With the loss of a market, down slid the feather industry into the depths. American ostrich farmers were panic-stricken; there was no longer a sale for their product. The tide of fashion had

184 THE IMPORTANCE OF BIRD LIFE

set away from them. Birds which a year before had brought a thousand dollars a pair now were eagerly offered for one tenth of that sum—with no buyers. The price level for breeding birds sank to twenty-five and thirty dollars apiece. In desperation the farmers killed the ostriches, gave them to "zoos," did everything they could think of to rid themselves of the feed bills that now threatened to swallow the profits of the last ten years. By 1920 only 231 birds were recorded as remaining on the once flourishing ostrich-farms of the United States. The curtain of the industry had rung down.

3

Non-Existence of Egret Farms

As a plume-bearing bird the ostrich stands in a unique position; it is the only one which has responded in any way to domestication. A wild creature may be tamed to exhibit no sign of fear in the presence of men, but very few will breed in captivity. The "zoos" are filled with birds prized for their plumage, egrets, birds of paradise, crowned pigeons, and a score of others, all of which seem to enjoy life in a large cage, but they will not rear young there. Thus, so far as their plumes are concerned, these birds are commercial nonentities. And for that very reason, because they will breed only in the wild state, have they

been slaughtered and some of their species brought to the verge of extinction.

Every few years or so strange stories come to our ears of regions where there are egret farms, where the birds are successfully reared for their plumes on a commercial basis. First there is such a farm in India; then it has moved to Venezuela, or to Egypt, or to Brazil. The plumes are said to be clipped from the backs of the snowy birds in much the same manner that feathers are plucked from an ostrich. No pain or flow of blood is reported to attend the operation, and the birds thrive and multiply vigorously under the influence of domestication.

Such tales are pure figments of the imagination. An egret farm, in the sense implied, has never existed and never will. It cannot. The birds do not breed freely in captivity. In fact there is only one possible record of a pair rearing young in a "zoo," and there have been thousands maintained in "zoos" during the last hundred years.

The stories have persisted, however. They are warped translations of the truth enlarged upon by plume hunters and those who are interested in seeing the plumage trade revive. A few rookeries exist in southern Brazil where great quantities of cast-off plumes may be picked up near the deserted nests at the close of the breeding season. But these are fragmentary, frayed, and worn bits of feathers, of little or no commercial value.

Again, certain landowners in Venezuela make a practice of leasing out the shooting privileges of their property to feather hunters. The egrets are not farmed. They are shot and killed in the breeding season for their plumes just as thousands have been shot and killed elsewhere. The plumes are torn from the backs of dead birds, not clipped from live ones or picked up in the muddy lagoons and marshes. Egret farming, as a commercial venture, does not exist.

4

Commercial Downs and Their Uses

Although the market for ornamental plumes has now shrunk into insignificance, there are certain other types of feathers which always will have great commercial value. These are the upholstery feathers, the downs of commerce which go to fill mattresses, pillows, and quilts. Only the small breast feathers of the duck, goose, and swan were utilized in former times, but to-day, so populous has grown the world and so insistent is it upon household comforts, enormous quantities of feathers from the barn-yard fowl are used. These last, however, are employed in making mattresses and low-grade pillows, whereas other downs, especially down from the eider-duck, go into the lighter quilts and pillows.

About a century and a half ago great multitudes

of eider and other down-bearing sea-ducks existed along the northeastern coast of North America. So numerous were the birds that they drifted in enormous "rafts," some a hundred acres in extent with several thousand ducks crowded into an acre, not far from the coast of Labrador, which was their home. And during the months of July and August they drifted helplessly, quite unable to fly. These months were their molting season. Unlike most other birds, ducks molt all their flight feathers at once, and thus can escape from their enemies only by the speed of their swimming.

Wonderful tales were brought back to the colonies by whalers and sealers of these helpless "rafts" and the ease by which the birds could be taken. The northern waters were reported as being so strewn with discarded feathers that the contents of all the feather-beds in the world might have been scattered there. The ducks were powerless to escape, and their crippled condition invited attack.

It is not surprising, then, that the American colonists took quick advantage of the opportunity to reline their bed-sacks. Massachusetts became the center of a young but thriving feather industry. Enterprising merchants chartered ships to send north after the drifting multitudes. Dozens of vessels spent each summer cruising off the Labrador coast.

"Feather" voyages proved profitable undertak-

188 THE IMPORTANCE OF BIRD LIFE

ings to every one concerned but the ducks. Upon a cry from the masthead that ducks were in sight, the nose of the vessel would be turned toward the ill-fated "raft." When close enough, the bow would shoot into the wind, and there would follow the splash of a number of small boats taking to the water. There could be no escape for the victims—scoters, eiders, and Labrador ducks; they were surrounded, raked by small cannons loaded to the muzzle with fine shot, clubbed to death with oars, and netted by the ton in large fish seines. Ten thousand could be slaughtered in a day by the crew of one vessel. The small feathers were stripped from their breasts and the bodies were tossed overboard to feed the fish. Untold millions met death in this way within the span of a very few decades.

There of course could be only one outcome to this promiscuous slaughter. The great flocks were broken up; the birds were scattered and exterminated. Eider-ducks became a rarity along the American coast; by 1878 the Labrador duck was entirely extinct;¹ and the scoters alone remained. Before the opening of the last century "feather" voyages had been discontinued as unprofitable. The hundred-acre "rafts" were gone forever.

A word now concerning eider-down. For its

¹ The last recorded living specimen of that species was shot in 1878.

bulk it is one of the lightest commercial substances known, having been utilized for thousands of years, first by savages and then by civilized men, in bed making and the manufacture of winter clothing. It is so elastic and firm that a quantity which when compressed might be covered with two hands will serve to stuff an ordinary quilt. In softness it is far superior to all other downs.

Eider-ducks inhabit most northerly regions, seldom traveling farther south in winter than the edge of the ice-cap. They are still plentiful along the coast of Norway, at Nova Zembla, in the Shetland, Orkney, and Faroe islands; and Iceland is the home of hundreds of thousands.

Although they have been severely treated and virtually annihilated on the Labrador coast, eider-ducks have been protected in other regions and in some localities have become partly tame. Such is the case in Iceland, where they form a means of livelihood for thousands of people. The eggs are rich in food constituents and palatable; the flesh is edible; the down is a source of income; and the skins, with the feather side turned in, constitute warm undergarments which protect the human body from the rigors of a cold winter. Eider-ducks, therefore, are one of the chief economic resources of Iceland. The birds are guarded there as carefully as if they were domesticated fowl, and the island is famous the world over for its eider-down industry.

190 THE IMPORTANCE OF BIRD LIFE

The finest down is obtained from the bodies of living birds, the feathers of dead birds being of inferior quality because of the loss of a certain softness and elasticity. The plucking is not done by hand, but by the birds themselves during the nesting season. The nest consists of a low structure of seaweed, lined with the soft feathers pulled by the female from her breast, and in this down are buried the four or five large pale-green eggs.

When the entire clutch has been laid, the down hunter cautiously approaches the sitting bird. If she fails to depart of her own accord, he carefully removes her and helps himself to all the down and all but one egg. Upon returning to the nest, which she will not discard because of the remaining egg there, the female deposits a second clutch, having first, however, relined the cavity. This again is despoiled.

Although by this time the breast of the duck is almost depleted of feathering, she does not appear in the least discouraged. By hook or crook she manages to glean a third covering of down for the third clutch and settles comfortably to hatch the eggs. The down hunter arrives on the scene. He is now more circumspect in his actions. He takes a peek at the denuded breast of the bird, examines the quality of the down covering the eggs, and decides whether she can stand a fourth plucking. If not, the nest is left undisturbed until the eggs are hatched and the ducklings have

departed. Then the inferior down is gathered and cleaned. And all through the nesting season the drake duck swims placidly out in the offing, eating, sleeping, and preening his feathers, quite oblivious of the tribulations of his mate. The feathers on his breast remain intact.

The eider-ducks of Iceland have grown so used to the presence of people near their breeding grounds that they will recognize the men who tend their nests. They dislike strangers, but will go so far as to allow themselves to be handled by those whom they know. The Icelanders treat them with the gentlest care, constructing artificial nests and warding off danger when possible. The birds return each year to the same spot and will breed in the close vicinity of buildings. Some have even been known to rear their broods on the turf roofs of inhabited cottages. By kindness and care they have been led into a state of semi-domestication.

But, as has already been mentioned, eider-ducks are not responsible for all commercial down. So great is the demand for this substance that they, in truth, are able to supply only a very small fraction. The downs ranking next in quality are those obtained from the goose and swan, the former bird producing thousands of tons annually throughout the world.

As with eider-ducks, the feathers from live geese make the best down, and as the geese do

192 THE IMPORTANCE OF BIRD LIFE

not line their nests, they have to be plucked by hand. It has been the custom for thousands of years in Europe to rear geese solely for their feathers, and the peasants derive a considerable income from this source. Some goose farms contain thousands of birds, the plucking of which takes place five times a year.

While the plucking of live geese continues to a lesser extent to-day than it did a hundred years ago, it is still done on a large scale, particularly in Europe. The birds, however, are now more generally reared for the food market, and, despite its inferior quality, the bulk of goose-down is derived from the bodies of these. The duck and goose farms of the middle United States thus annually supply the upholstery industry with hundreds of tons of feathers as one of their by-products. In the same way the poultry farms find a ready market for the pickings of the fowl.

Before they can be used, all down feathers have to undergo a cleaning process, first to free them of foreign matter and second to extract any greasy substance which may remain and which might cause an offensive odor. In chicken feathers only the barbs are utilized, the feathering being stripped from the shafts and the shafts discarded. This type of down, because of its lack of springiness, is employed mainly in making mattresses.

5

Minor Feather Industries

Aside from the downs and ornamental plumes, there are still other uses to which feathers are put which have a considerable commercial status. Although their bulk is small when compared to the upholstery downs, the industries for which they form a necessary adjunct are numerous.

Until the appearance of steel pens, quills were the only implements that could be utilized for writing, if, of course, we except the fine brushes of the Far East. Their day extended from the sixth to the beginning of the nineteenth century, and even now quill penholders with steel nibs have a certain popularity. In former times, however, when feathers were the only pens, their quality was a matter of the utmost importance to the writer, and great care and forethought were given to their selection. Feathers of the crow, turkey, eagle, or hawk served the purpose well, but the best quills came from the wings of geese. The left wing only was depleted, those feathers curving outward and away from the writer, and only the outer five flight quills were taken. Of these the second and third were considered the best.

The plucking was done in the spring, at the com-

194 THE IMPORTANCE OF BIRD LIFE

pletion of the molt, but before the feathers had time to become frayed by usage. The barrel of the shaft was softened in a sand-bath at a temperature of 130° to 180° F. and immediately scraped clean under pressure. The outer skin was then easily removed, the inner shriveled up, and the shaft was freed of all greasy material. While it was still hot and soft, names, trade-marks, or ornamentations could be stamped upon it. This process is still used.

In the manufacture of feather dusters the wing- and tail-feathers of turkeys and other domestic fowls are utilized. A superior quality of duster has been developed from the feathers of the American ostrich.

Again, feathers are used in the manufacture of Chinese and French feather flowers, artificial butterflies, various toys, darts, camel-hair brush-holders, toothpicks, and fishing flies. While individually these minor industries are unimportant, collectively they represent an added interest to the commercial world of a great many million dollars.

And when we consider as one the plumage dealers, the ostrich farmers all over the world, the eider-down hunters of Iceland and elsewhere, the plume manufacturers, the upholsterers, and the people employed in the minor feather industries, we have no inconsiderable list. It is not difficult

to conceive that the feather business, in one form or another, plays a well-defined part in the trade economics of the world.

CHAPTER X

GUANO

1. Where Found.
2. Guano Birds.
3. Historical Significance of Guano.
4. The Search for Guano by the United States.
5. Peruvian Guano.

1

Where Found

The name "guano" is applied by farmers to any commercial fertilizer which contains a balanced ration of nitrogen, phosphoric acid, and potash for growing crops. In the stricter nomenclature of fertilizers guano is a highly nitrogenous material containing animal matter, which when broken down by contact with the soil makes available the necessary chemicals for plant growth. For example, thousands of tons of dried and ground fish are annually produced for fertilizer under the title of guano by the menhaden fisheries on the Atlantic coast of the United States.

But "guano," in its true meaning, can only be applied to excrement, and mainly to that of birds. Small amounts are from time to time discovered in caves where the droppings of bats have accumulated to form a thin layer on the floor, but

this guano is of little economic importance. By far the greater bulk of the material is produced in the great rookeries of sea-birds which here and there dot the surface of the earth.

Some of these rookeries no longer exist, for the birds changed their breeding-ground perhaps a thousand years ago, but their excreta remain in thick beds many feet deep. Here, after centuries of leaching, the nitrates have gathered in large pockets in the form of crystals, or what is better known as saltpeter. In Chile and Peru there are enormous accumulations of these nitrates, commercially termed Chile saltpeter, which are nothing more than ancient guano deposits altered by time and the elements.

Although excrement is the basic element of guano, dead fish, dead birds, rotten seaweed, and all the refuse which accumulates about a rookery are included in its make-up. Together these make an evil-smelling compound, but one highly beneficial to plant life when applied to the soil.

The fresh product is naturally high in soluble minerals. If laid down in a region of moist climate, constant leaching follows, causing it to lose much in valuable fertilizing compounds. The potash and phosphoric acid, being already in a soluble state, are dissolved off by rain-water, and the presence of lime leads to a decomposition of the organic material and a subsequent release of nitrogen in the character of ammonia. Therefore,

only guano from arid, rainless localities retains full strength for any prolonged period of time and is accounted as the best quality of fertilizer.

The dry coast of Peru is perhaps the most ideally situated region in the world for the production and preservation of the raw material. In addition to an abundance of food for the seabirds in the ocean currents which sweep the coast, some sections have virtually no rainfall, others less than an inch per annum. A few miles off the lower central part of the coast rise three small rocky islets, known as the Chincha Islands, which are the home of millions of guano-producing birds. Rain is almost an unheard of phenomenon, and the guano accumulated there in an absolutely pure state for many centuries. Farther north lie other islands, the Lobos group, which, though situated in a slightly damper climate, are also famed for their deposits. It was from these two groups that for many years came the world's main supply of natural guano.

But Chile and Peru are not the only countries in the world where guano, or its products, are obtained. It is found in lesser quantities on the coasts of Venezuela, Colombia, and Ecuador. The West Indies have produced a small amount. Shark Bay and Swan Island have supplied some to Australia. There are deposits on many islands in the Pacific. Guano is also found in Algoa and Saldanha bays near Cape Colony, on Ascension

and Ichaboe islands off the west coast of Africa, and at Kuria Muria in Arabia. Low-graded deposits have been found elsewhere.

2

Guano Birds

Before dicussing fully the merits and historical significance of guano, we had better inquire more thoroughly into its origin. As the Chincha Islands are the most important source of the product, we shall take as an example the conditions there met with.

A few leagues off the Peruvian coast a great ocean current sweeps north, bearing with it immense schools of small fish termed anchovies, and countless myriads of tiny shrimp-like crustaceans. Between the current and the mainland stand the three rocky Chinchas, where are congregated one of the most formidable arrays of birds the world has ever seen. They are mainly cormorants, gannets, and pelicans, with a sprinkling of jack-ass-penguins, gulls, and skuas. These move over the water in swift-changing clouds, darting, plunging, and hovering incessantly, or resting on the water in great rafts which stretch into the distance.

The fish are the attraction, and all day long the birds pursue them until, gorged and logy, they finally fly on heavy beating wings back to the

cliffs which are their home. The performance is repeated daily throughout the year, and daily tons of fish are consumed; but there seems to be no end to the anchovies. Despite the steady inroads upon their hosts they are as plentiful now as they were a thousand years ago.

Only four species of birds are responsible for the main deposition of guano. Of these the cormorants, or, as they are locally named, *guanayes*, are by far the most numerous. Their rookeries lie like great dark shadows of immovable clouds on the sloping expanses of rock whitened with chalky guano. The nests occur in the ratio of about three to the square meter, a single rookery often covering as much as a hundred acres.

The nests are merely slight depressions in the guano layer which overlies the rocks, and each contains a pair of young who have to be fed. This necessitates a continual flight of parent birds to and from the ocean, a never-ending stream of hurriedly moving bodies. The young gobble what fish are brought, leaving the residue which they cannot swallow to rot on the ever-growing walls of refuse that surround the nest cavity. Daily these ramparts mount higher. Each bird of the family contributes its share, mother, father, and offspring. Excrement is also plentifully distributed on the floor of the home; it is trampled down, and the level of the nest rises higher. Gradually a fresh layer of guano forms over the rookery

area. It is estimated that each bird annually adds the worth of about a dollar and a half as its share.

Second in importance to the cormorant as a guano producer stands the pelican, termed *alcatraz*. This bird unfortunately prefers the more humid northern islands of Peru, and its product, when gathered, is therefore of poorer quality. It is excitable by nature and inclined to resent the extraction of guano from its rookery, and for that reason, in former days of wholesale depletion of the beds, it greatly fell off in population. Now, however, under scientific conservation of the guano and close protection, it is regaining the numbers once lost and bids soon to play a more important part in production than ever before.

The *piquero*, or gannet, stands third in importance on the list. Although these birds make numerically an enormous showing they have an unfortunate habit of nesting on cliffs, with the result that a considerable portion of their product falls into the sea and is lost. By the construction of shelves, however, much of this decrement is now saved. Notwithstanding this, the annual loss still can be estimated in thousands of tons. The birds leave twice as much excreta around their nests as do the cormorants.

The fourth guano producer also is a species of gannet, the booby. Like the pelican it prefers the northern islands and hence plays but a small part in the Chincha group. It is a big producer,

however, and in the Lobos its numbers have increased enormously under protection.

3

Historical Significance of Guano

The first available knowledge of guano being utilized as a fertilizer comes down to us from the legends of the early Incas of Peru. The then apparently exhaustless beds of the Chinchas were worked at that time, and the plantations of the Incas thrived under the impetus given the crops by the manure. So valuable did the Indians consider the deposits that the penalty of death was imposed upon any one caught destroying guano-producing birds.

Upon the arrival of the Spaniard the great Inca Empire was shattered. The natives were conquered, their fields despoiled, and as slaves they were driven to the mines. The Spaniard wasted no thought on paltry fertilizer; his eyes were sharpened only for a sight of that glowing metal, gold. From the saltpeter beds he manufactured gunpowder with which to advance his conquests, but of guano he had no knowledge—or inclination to use that knowledge, if he had it. He was a warrior, not a guano burrower. To him the Indians were God-sent slaves especially created to labor in the mines, not to pass the time on the filthy Chinchas.

Thus the islands stood for three centuries after the coming of the white man, buried beneath a hundred-foot blanket of guano, the true riches of Manoa, neglected and disregarded. Then, with the opening of the nineteenth century, the world suddenly realized the true worth of what for so long had merely awaited the wielding of a pick and shovel.

The first specimens of guano from the Chinchas were brought to Europe in 1804, but forty more years elapsed before its value as a fertilizer was recognized by the people as a whole. Then followed a rush comparable to the gold rush of a few years later in America. But, instead of prairie-schooners and oxen, the seekers employed sea-going vessels and sails. Guano was the goal.

Ships gathered about the Chinchas like bees around a bowl of honey. Vessels of all nations met there, loaded themselves to the gunwales, and departed, to return as fast as the wind would drive them to their home ports and back around the Horn again.

By the middle of the century the crush was at its height. It was no uncommon sight to see fifty vessels loading simultaneously around the Chinchas. Hundreds of thousands of tons had now disappeared from the islands. The deposits seemed inexhaustible to the guano merchants. By 1872 about ten million tons had been extracted; the height of one island had been lowered five

204 THE IMPORTANCE OF BIRD LIFE

score feet. And the birds, much perturbed by the unnatural activities around their homes, began to die off.

In the meantime Peru was making the best of a good bargain from other natural resources owed to birds. Together with Chile she was working her nitrate beds for all they were worth. These were responsible for a large portion of the world's gunpowder, and there was an ever-increasing demand for their product. Civil war had broken out in the United States, Europe was aflame with martial activity, and there was a pressing call for more ammunition to fight battles.

So enormous were the nitrate beds that Chile and Peru heartily congratulated themselves and cheerfully supplied the growing demand. A million and a half tons of Chile saltpeter were taken out in one year. In 1860 it had been estimated that the deposits were sufficient to supply the world for 1500 years more; three decades later a few optimists thought that the nitrates might possibly last forty years longer, so heavily had the beds been plundered.

Peru waxed opulent. She owned both guano and nitrate beds. An export duty was levied on all the material taken out. As the trade flourished, her national wealth multiplied. All internal taxation was abolished. A supposedly ideal government was established, a government which

subsisted entirely upon an income derived from natural resources.

Alas, all the geese proved to be swans! Chile was jealous of the good fortune of her neighbor across the border. Chile owned no guano islands. Her own income was dependent upon her saltpeter beds, and these were insufficient to supply her needs. The iniquitous Peru had secured more than her proper share of the spoils. And, to make it worse, her largest nitrate beds were situated close to the Chilean border. These should belong to Chile; Peru ought to be satisfied with the guano deposits alone.

The inevitable war between the two countries broke out in 1879. After a considerable period of desultory fighting, Chile claimed the victory. In compensation for the real or fancied wrongs inflicted upon her, she annexed the rich province of Tarapacá and all the nitrates it contained. Thereafter she rested upon her laurels, more or less satisfied.

4

The Search for Guano by the United States

Although never deeply interested in the salt-peter beds, the United States was among the leaders in the pursuit of guano—a position into which she was forced by her economic situ-

206 THE IMPORTANCE OF BIRD LIFE

ation. With the opening of the Mississippi Valley, her agricultural possibilities had increased ten-fold. Fertilizer became an article of necessity in the extension of husbandry. At that date the chief resources of the United States were based on her agriculture: she needed guano and needed it badly, but it was difficult to secure it in large enough quantity. Even as early as 1850 the price had soared as high as fifty dollars a ton. Though many farmers were too poor to buy it, the supply still fell far short of the demand.

In desperation the United States Government entered into negotiations with Peru to obtain a major portion of the Peruvian output. The proposed plan would give America what amounted to a monopoly on the guano trade, and Peru balked at the idea. She was too wily to be caught in this way; the high price of guano was too vital to her existence. Grave international complications therefore arose, and the United States was snubbed. Then, despairing of an agreement with Peru, she concentrated her attention elsewhere—upon the islands of the Pacific.

The American Guano Co. of New York was organized in 1855 with a capital of ten million dollars to develop the deposits on Baker and Jarvis islands in the South Pacific. In the following year the Federal Government passed a Guano Act to encourage exploration for guano. Everything

possible was done to further individual interest in guano seeking.

The Guano Act set forth that any American citizen who discovered an island not under the jurisdiction of a foreign government might, if he desired, remove any guano which might be present, under protection of the United States. Hitherto national policy had frowned upon extension into territory outside the continental limits of North America; but now the necessity for an increased supply of fertilizing material led to a deviation from this traditional policy. It was declared, however, that only peaceable occupation of the islands would be countenanced by the United States; any departure from this line of conduct would mean the loss of the island to the discoverer, whether private individual or developing company. Under the act, upon the exhaustion of the guano beds the island must revert to the United States as its lawful owner; and it might be returned to its former status of unclaimed territory if the government so desired.

By 1898 more than seventy islands had been located under this Guano Act—fifty-four in the South Pacific and seventeen in the West Indies. Of these the majority proved worthless, but a few yielded small amounts of the desired product. In this way, between 1869 and 1898, something more

208 THE IMPORTANCE OF BIRD LIFE

than a quarter of a million tons was procured for use in the United States. The island deposits, however, were comparatively small, and by the beginning of the present century they had been worked out. Laysan Island, several hundred miles northwest of the Hawaiian group, alone of them all still has a future in the guano industry, but the island is small and its production of guano is low.

5

Peruvian Guano

When the failure of her new plan became evident, the United States turned her attention back to Peru. Her importations from that country had never ceased, and now she sought to double and quadruple them. But again her plans met with a check. This time, however, there proved to be no international complications involved. The inexhaustible supply of Peruvian guano was merely giving out!

At the close of the war with Chile, Peru had found herself deeply buried under a national debt. She discovered that warfare is indeed a costly pastime. Then, in a frantic effort to emerge from under the burden, she had mortgaged the Chincha and Lobos groups to private corporations.

The results of this step are not difficult to understand. Under the terms of contract the

greater part of the guano had to be exported. And exported it was. The hundred-foot beds disappeared as if they were melting snow. The end soon hove in sight. By 1907 only 124,000 tons were extracted as against nearly ten times that amount forty years earlier. The old guano which remained was of inferior quality; the production of the new annually decreased as the birds died off.

In signing away her guano rights to corporations, Peru had been short-sighted in more than one way. What was deemed sufficient fertilizer for her own agriculture had been reserved, but the inevitable expansion bound to follow in a new country had not been considered. Soon it was discovered that not half enough guano had been placed in reservation; but it was too late. Peru's hands were bound by contracts. Four times the amount she needed for herself were annually being exported to foreign countries.

Peruvian agriculture suffered. In addition, owing to the continual and ruthless destruction of the rookeries, the sea-birds were rapidly becoming extinct. Instead of a yearly deposition of a hundred thousand tons of fresh guano, the birds now produced scarcely one fifth of that amount. The country faced a wiping out of its income, both from agriculture and from guano.

Peru was desperate; she was panic-stricken. Her enormous wealth had been expended, leaving

210 THE IMPORTANCE OF BIRD LIFE

nothing to show for it. Then she did what she should have done half a century before. As fast as the leases to the private corporations ran out, the islands were taken over by the Government and conservation commenced.

The welfare of the guano islands was placed in the hands of the Compañía Administradora del Guano, a semi-official corporation controlled by the Peruvian Government. The duty of this company was to put the extraction of guano upon a purely economical business basis. When an island was returned from private lease, its administration was at once undertaken by the new company, and for the first time in the history of Peru the production of guano was handled from a scientific point of view.

The initial move of the Compañía Administradora del Guano was to curtail the promiscuous export of the product. Thereafter the fertilizer was to be employed only within the national boundaries of the country until all internal needs had been met. As the old beds had been exhausted, it was realized that the hope of a future guano industry lay in an increase of fresh production. This, of course, could be effected only by an enlargement in the size and number of rookeries.

With these objects in view, each island was erected into a bird sanctuary, closed to all visitors whose presence might disturb the birds. Watchmen were detailed to guard the reservations from

marauding creatures, such as condors, eagles, skuas, and gulls, which extract a considerable toll from the young birds and eggs. The psychology of the sea-birds was studied and steps were taken to avoid disturbing them as much as possible during the gathering of their excreta. This was removed with all speed once every thirty months and the island vacated immediately afterward. In short, every manner of means was attempted to cause the birds to multiply.

The result of this careful treatment, after thirteen years, is entirely satisfactory. The number of birds using the guano islands has visibly increased. They are tame, contented, and prolific. In a single decade, from 1909 to 1919, their annual deposits rose from 25,350 tons to 80,517. Peruvian agriculture called for 50,000 tons in 1907 and received only 26,000; in 1920 it demanded 70,000 and got them. What is more, the nitrogen content of the guano, which in 1913-14 averaged about 8.65 per cent., had through some unknown cause reached 12.52 per cent. in 1920.

The extraction of guano is not permitted during the main breeding season of the birds, from November to March. As each bird is valued at fifteen dollars by the Peruvian Government, it has been made a penal offense to destroy either the birds or their eggs. Thus the feathered population of certain islands, which ten years ago had fallen to a few score thousand, now totals a million

212 THE IMPORTANCE OF BIRD LIFE

individuals or more. The future of the industry has brightened, and it is not too much to expect that some day not many years in the future will see the exportation of hundreds of thousands of tons as of old. The birds, ably assisted by the Compañía Administradora del Guano, are doing their best to win back that day.

That is the story of guano. For Peru it is almost the whole story. Her bird colonies are a source of wealth which may be counted in hundreds of millions of dollars. They are her most important natural resource, one upon which she can depend for a steady annual income.

CHAPTER XI

BIRDS AS FOOD

1. In Europe.
2. Bird Eggs.
3. Edible Bird Nests.
4. History of American Birds as Food.
5. An Economic Resource of the United States.

1

In Europe

Birds and their eggs have been utilized as food since the earliest years of human antiquity. In the dark days before the development of agriculture, eggs formed a staple diet for mankind, just as they do at present for the Eskimos and modern savage tribes. Even now both birds and eggs are esteemed as delicacies by most civilized peoples, though their place as a common aliment has been taken to a large extent by domestic fowl.

The birds of Europe have been consumed in enormous numbers in the past. For two thousand years they were considered the property of any one who desired to take them. Only game-birds were vouchsafed any protection, and they were reserved for slaughter by persons of rank; song-birds and water-fowl could be captured at will at any time of the year.

214 THE IMPORTANCE OF BIRD LIFE

This is the condition that existed in Europe until comparatively recent times and is even so to-day in Italy. Seventy years ago it was not an uncommon thing to see larks, linnets, thrushes, starlings, and magpies hanging by the gross in the shop-windows of any city in Europe. They were toothsome morsels, greatly sought after by epicures. Hundreds of persons made a living by their capture, which was contrived with nets, traps, and guns; and their sale brought a considerable income to the shopkeepers.

But the wholesale slaughter of birds has had its ups and downs. At one period in the history of Europe it might be frowned upon by the governing powers; a generation later it might be encouraged. Thus, in France, immediately before 1789, game-birds were rigidly protected by law and might be killed only during short open seasons. The slaying of other kinds for food, while not forbidden, was not popular. Then came the French Revolution, and a wave of communism swept over the country. Laws limiting the personal freedom of the individual were abolished, game-laws included. The birds and game of France were turned over to the people to do with what they willed. They willed to eat them.

When Napoleon forced himself to the throne of France, he lost no time in reëstablishing the game-laws. But all birds other than game were

overlooked, and their death toll continued to increase. Owing to the state of war which prevailed in Europe at that time, food was expensive and scarce in France. Birds were easy to catch and cost nothing. Therefore, they became food for the French people.

Once the habit had been instilled in the peasantry of securing food in this way, only the enforcement of stringent laws could break it. As a result of the promiscuous slaughter of the previous fifty years, the agriculture of France by the middle of the nineteenth century was virtually ruined by succeeding waves of insect pests, aided by swarms of rodents which devoured the crops. An official investigation showed that all birds were on the edge of extermination; they had gone to provide sustenance for the peasants and to fill the markets of Paris. The French Government at once enacted laws to protect all but a few birds. The laws were enforced, and within a few years the bird population had revived. The shops were no longer cluttered with their bodies, and the insect and rodent scourges had become memories of the past.

The story of Italy, however, is very different from that of France. Italian birds still are the property of any person who wishes to take them. They are excellent eating: therefore Italy is with-

216 THE IMPORTANCE OF BIRD LIFE

out birds except in the migratory seasons when the winged travelers from northern Europe pass over her boundaries.

Bird killing in Italy is on a scientific basis. The markets are flooded with the little bodies during the late autumn, and birds are regarded as one of the commercial resources of the country. In reality, however, they represent a rich resource of all Europe which is employed by Italy for her own benefit. Small birds fetch from two to five cents apiece in the market. They may be bought singly or strung on long spits. The majority are song-birds, though a few actually belong to the proper list of migratory game.

The Italian method of procuring them is by means of traps, of which several kinds are employed. For instance, there is the *roccolo*, a tower set up in the midst of a small grove of trees or brush, from which are strung a series of fowler's nets. The bird-catcher remains hidden inside the tower, while, outside, his live decoy-birds entice others into the toils with their calls.

Or the fowler may utilize as a trap a high circular wall completely lined inside with nets. The bottom of the inclosed court-yard is liberally covered with grain, and several call-birds are loosed there to feed. Migrating individuals, assured by the presence of the decoys, flock down beside them. Then, when a sufficient number have collected, the trapper discharges a gun. Wild

consternation follows the report. The birds scatter, panic-stricken, in all directions, and many are enmeshed in the netting.

These two means of trapping afford an excellent living to the bird-catchers. Five hundred birds may be secured in a single trap within a week. Some *roccolos* have been known to take 10,000 in a season.

Concerning Norway and Sweden there is a different tale to tell. There birds are protected by most stringent laws. Song-birds have a permanently closed season, but game in the form of grouse, pheasants, ducks, and geese is marketed in large quantities. The sale is limited to short seasons and care is taken to avoid too heavy slaughter. Game-birds are sold to the value of several million dollars annually.

Under the British law, during the autumn months the shops of England are also filled with pheasants, grouse, and partridge. The majority of game lands in that country are privately owned and the birds are carefully reared and guarded for shooting. Care is taken not to kill more than the preserves will easily afford, and the surplus bag which cannot be consumed by the sportsmen is sold.

A definite market has thus been developed in England, one which is not detrimental to the increase of game-birds and yet is of actual commercial importance. During the World War, when

218 THE IMPORTANCE OF BIRD LIFE

England was on a ration basis, this additional food product proved of great value. Because of previous conservation of game there was a large quantity of food on hand which now could be utilized.

Early in the war the Ministry of Food issued regulations regarding the disposal of game. The owner, or occupier, of a "shooting" was permitted to keep enough birds for himself and family, but all that were left over *must* be shipped to the market. The sportsman had no option whatever in the disposal of his bag. The price of cock-pheasants, in 1918, was officially set at five shillings eightpence each; hen-pheasants at five shillings twopence; old partridges at one shilling ninepence; young partridges at three shillings sixpence; old grouse at two shillings sixpence; and young grouse at five shillings.

Song-birds, while protected in most parts of Great Britain, are still killed and eaten in some regions. When the war was being fought, crows, rooks, sparrows, starlings, and storks could officially be taken as food; but many other birds found their way to the market. Gull eggs were also consumed in large numbers.

Bird Eggs

While a promiscuous destruction of eggs is the

swiftest way to annihilate any species of wild bird, eggling when conducted in a conservative manner need not be productive of harmful results. A living example of this is to be found in the eider-ducks of Iceland. For more than a thousand years these birds have supplied the Icelanders with food, clothing, and bedding; and yet they are as numerous as they were in the beginning. The colonists took care never to kill more birds than were necessary for their needs. Although the Icelander, after several incursions, secures from ten to a dozen duck eggs every season from each nest, he makes certain that enough are left so that the population of the ducks will not suffer.

The world in general, unfortunately, has not followed the Icelander's example. If it had done so there would be many more birds alive than there are to-day. Many great colonies have been destroyed or thoroughly disorganized by the inroads of egg hunters. And this has been the fate of most rookeries along the American coast. Until State legislation put a stop to it, every egg more than one inch in diameter that could be found along the Atlantic seaboard was considered fair booty for the egg merchant.

From Nova Scotia northward such sea-fowl as auks, murres, cormorants, ducks, and geese were wont to breed in vast numbers. Yearly their breeding-grounds were devastated until the actual

220 THE IMPORTANCE OF BIRD LIFE

longevity of the species was threatened. To-day auks, murres, and even cormorants do not number one tenth what they did a century ago; the Labrador duck, partly through the efforts of egg-hunters, is now extinct; and the eider-duck no longer breeds in great rookeries along the Labrador coast. Instead of boldly constructing their nests in the open as was their ancient custom, these birds now rear their broods surreptitiously in tall patches of grass or upon rocky ledges inaccessible to men.

The same fate has befallen the gull, tern, and heron rookeries of the southern Atlantic and Gulf coasts of the United States. Only forty years ago vessels were specially outfitted for raids on the sandy islands off the shores of Virginia and the Carolinas. In Texas, during the nesting season, every boat on the coast, large and small, gathered at the rookeries.

The procedure of the collectors in those days was identical with the procedure employed everywhere else. The first step upon arriving at the breeding-grounds was to destroy every egg in sight. The birds thereupon laid fresh ones, and these were gathered every second day until the laying ceased. No thought was given to conservation or protection of the creatures that were responsible for the eggs. These were merely picked up as long as there were any to pick up. The result was that the birds could not rear suffi-

cient young to maintain their numbers. The rookeries every year became smaller and the birds more scattered. Finally, it no longer paid the hunters to visit the islands.

But, while the trade was at its best, the cargoes of eggs were shipped to the nearest market. Great quantities would be broken in transit, or, if the weather proved warm, they would rot. Only a small percentage reached their destination, and these were as a rule of extremely poor quality. And the prices obtained were low.

The fate of the Pacific coast rookeries was identical to the fate of those on the eastern seaboard. Islands, cliffs, and sand-dunes, from Alaska to southern California, were stripped of their avian products. So enormous were the colonies of murres alone that six men have been known to load four tons of eggs into a vessel at Walrus Island in Bering Sea in three hours.

At one time millions of gulls and murres nested in the Farallone Islands, situated about thirty miles from the Golden Gate. Egg collecting went on there for fifty years until only a remnant of the rookeries remained. Corporations were organized to handle the industry, so important did it seem. Vessel-load after vessel-load arrived at the market in San Francisco. Half a million eggs were taken in 1854 from South Farallone Island alone; thirty years later this number had fallen to three hundred thousand; and in 1896 only

222 THE IMPORTANCE OF BIRD LIFE

ninety-two thousand reached San Francisco. The eggs were worth from twelve to twenty cents a dozen in the city.

A corporation also undertook to handle the eggs and guano of the Laysan Island albatross rookery. Narrow-gage tram lines were laid over the island for the purpose of collecting the guano. During the breeding season the eggs were gathered by the car-load and rolled to a central shipping-point where they could be placed on a vessel, or be cooked up for the guano diggers if food happened to be running short.

But, by the enactment of State laws, and through the making of government preserves out of the remnants of the sea-bird rookeries, egg hunting is now unlawful in the United States and Canada. Poachers still continue to take a small toll, but their raids are insignificant compared with what went on fifty years ago. The rookeries are at last regaining the numerical strength which was theirs in the days of our great-grandfathers.

3

Edible Bird Nests

Though of far less general utility as food than the eggs of birds, the nests of a small group of swifts which inhabit southeastern Asia and most of the adjacent islands are sometimes eaten. These swifts are tiny creatures ranging from three and

a half to five inches in length, and their nests are correspondingly small. They nest in great caverns, swarming there in hundreds of thousands, and the swish of their rapidly beating wings may be likened to the roar of a gale as it tears through the rigging of a ship. The nests, manufactured from the glutinous saliva of the birds, are attached to the sides of the rocks in the form of small, saucer-like cradles.

The Chinese prize these nests highly as food, employing them as an ingredient of their famous bird's-nest soup. The nest of the esculent swiftlet is the one most used. The bird is a native of Borneo, and the collecting of its nests constitutes there an important industry. More than three and a half million have been exported from that region in a single year.

Mr. H. Prior, who about thirty years ago visited a cave in Borneo, gives the following description of the methods pursued by the bird-nesters:

In this cave I saw the nest gatherers at work getting in their crop. A thin rattan ladder was fixed to the end of a long pole and wedged against the rock: two men were on the ladder; one carried a long, four-pronged spear, a lighted candle being fixed to it a few inches below the prongs. A slight twist detaches the nest unbroken from the rock; the spear is then withdrawn until the head is within the reach of the second man, who takes the nest off the prongs and places it in a pouch carried at the waist. The nests of best quality are bound up

224 THE IMPORTANCE OF BIRD LIFE

into packets with strips of rattan, the inferior being simply threaded together; the best packets generally weigh one catty ($1\frac{1}{3}$ lb.), averaging forty nests, and are sold at \$9 each, the annual value of the nests gathered being \$25,000. These caves have been worked for seven generations without any diminution in the quantity; three crops are taken during the year.

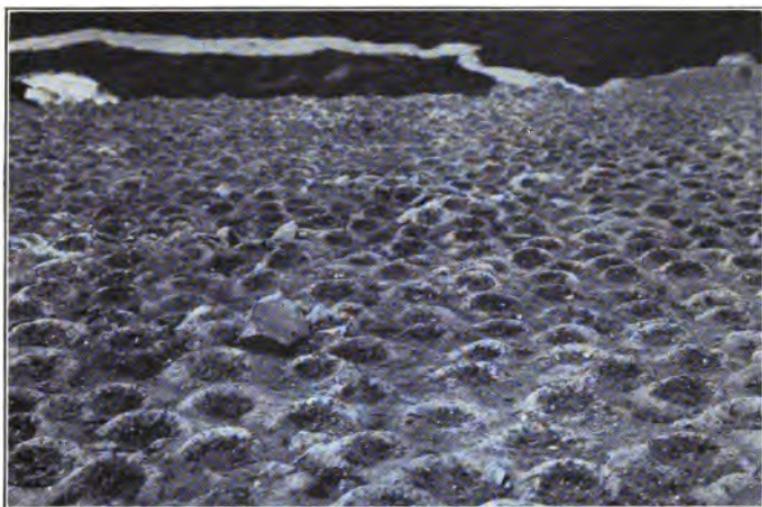
The white nests are supplied entirely by the inspissated saliva of the bird, and are the first produced. These are taken and sold for their weight in silver. The next made by the birds are mixed with rootlets, grass, etc., and often show traces of blood, from the efforts of the birds to produce the saliva. They are esteemed second quality. The third nest is composed of extraneous substances cemented together and to the rock with a little saliva; these are generally left to the birds to breed in, and are usually destroyed at the end of the season, to compel the birds to build fresh white ones.

4

History of American Birds as Food

The ruthless slaughter of birds in Italy has been touched upon in a previous section of this chapter, as has the scientific marketing of game-birds in Great Britain and elsewhere in Europe. We now arrive at the game markets of America, and what an ugly story we find it is!

When the first white settler reached America he was amazed at the hosts of all manner and descriptions of birds. So numerous were they that



Courtesy of Dr. R. C. Murphy

DISUSED CORMORANT NESTS, SHOWING THE GUANO READY FOR GATHERING

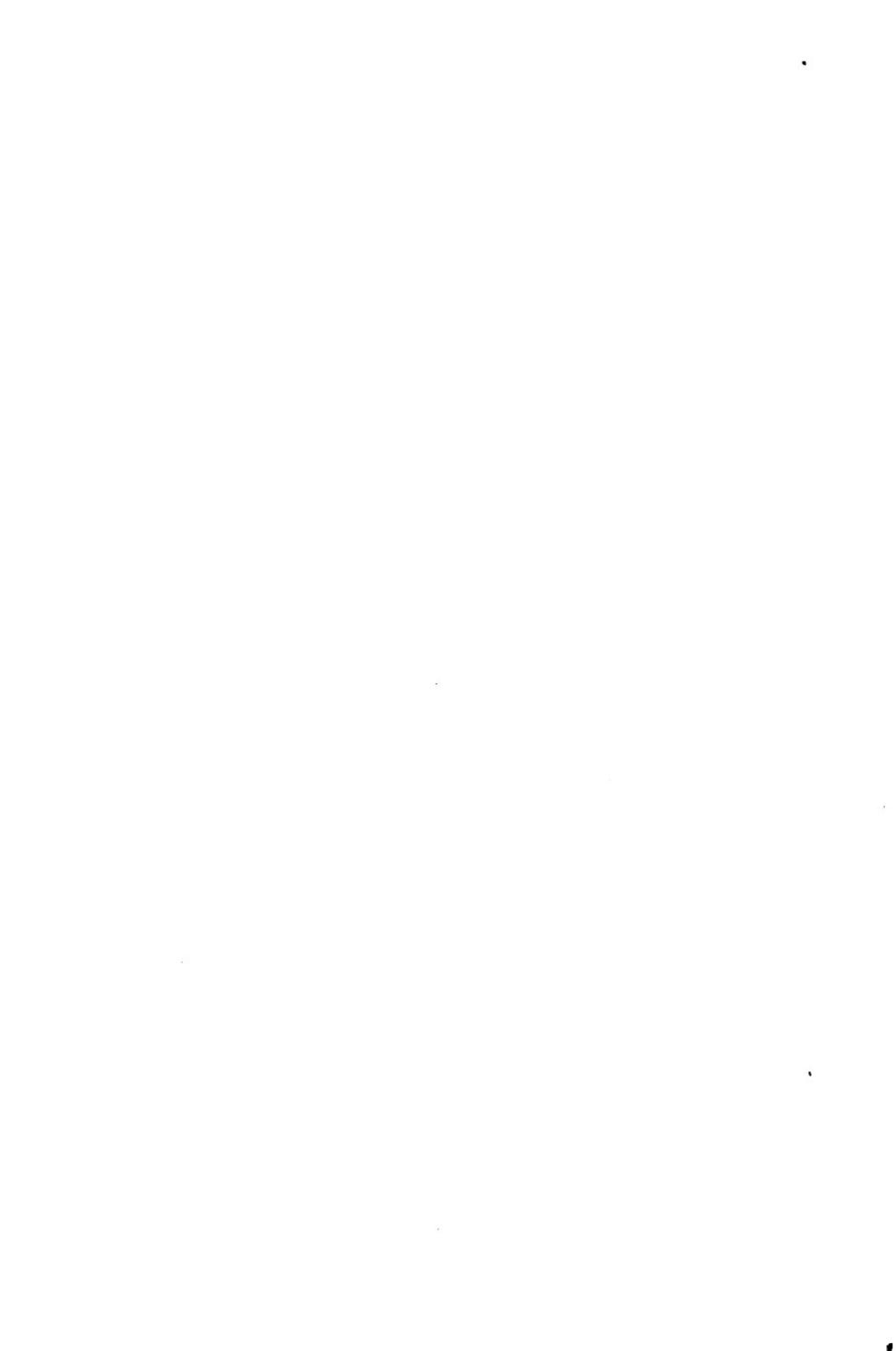


Courtesy of the National Association
of Audubon Societies

Photograph by
T. G. Pearson

A CABOT'S TERN COLONY IN TEXAS—THESE ROOKIES WERE DEPLETED BY EGG
HUNTERS

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it was inconceivable that the supply should ever be exhausted.

But the first settlers did not bother to kill birds. The forests and plains teemed with large four-footed game whose meat was delicious. The cost of ammunition was too high to waste it upon smaller stuff. The hardy professional hunters of pioneer days were killers of deer, bear, and bison; grouse and ducks were beneath their notice.

However, as the years passed, the time arrived when, late in the eighteenth century, large game grew scarce in the more settled regions. Market hunters were forced to seek deer so far from the cities that it no longer paid to haul them back to market. Bear were scarce and bison had been exterminated throughout all the territory east of the Ohio. Then it was that birds actually began to suffer.

Throughout the last century, and the first decade of the present one an internecine slaughter of game-birds fed the markets of this country. In the earliest days, when the birds were most numerous and less likely to take fright in the presence of men, nets proved the most profitable means of securing them. Ducks could be driven or decoyed into the toils without difficulty. The netting of quail took no great skill; heath hens proved docile and stupid; and nets were the only method by which it paid to kill wild pigeons.

So great was the resulting slaughter of the last two species that both finally succumbed. The heath hens went first—except for the small remnant which still inhabits Martha's Vineyard, Massachusetts—and the passenger pigeon lingered on for a few years longer.

As early as 1815 Audubon says that he saw schooners tied to the wharves of New York laden with pigeons. From that time forward the slaying of these birds went on without abatement, until the species suddenly ceased to exist. It is estimated that approximately a *billion* were killed in Michigan in 1878. About twelve million were shipped from one Michigan town in a single season and from another town about sixteen million in two years. These birds brought twelve to fifty cents a dozen in the market. The last one alive in the wild state was killed in 1908.

Supplementing his nets, the professional hunter for many years employed cannons against the great rafts of water-fowl which lay on the quiet waters of our coastal bays. These weapons were utilized mostly at night when the victims rested in compact flocks on the water surface. The cannon was mounted in the bow of a boat on a tripod and swivel. The boat was then silently piloted up to a sleeping flock, and the gun, crammed to the muzzle with small shot, was discharged into its midst. The slaughter was ghastly and extremely wasteful. Perhaps two hundred bodies might be col-

lected, but twice that number would be left to drift away unseen in the darkness.

Batteries, consisting of a number of gun-barrels secured to a framework and so arranged that they could be fired simultaneously, were also used against ducks and geese. The victims were decoyed to the spot covered by the battery and there annihilated at a single discharge.

Even to-day there is a similar apparatus, termed an *armada*, in use in Mexico. Three hundred gun-barrels are employed, all aimed to sweep the surface of a small pool. They are arranged in two tiers, the lower one being directed at the water, and the upper to clear the surface by a few feet. The ducks are attracted within range by scattering feed on the pond, in the same manner that they are baited on Long Island. The birds remain unmolested until thousands acquire the habit of occupying the pool. Then, when a sufficient number have collected, the *armada* is discharged. It is on record that one discharge has accounted for 4696 birds.

Netting and trapping were at last made unlawful in the United States, but only when it was almost too late to save the birds. The use of cannon and night shooting were also prohibited. Thereafter the market hunter was forced to rely upon the shot-gun only, and upon the straightness of his aim.

Notwithstanding the passage of new protective

228 THE IMPORTANCE OF BIRD LIFE

measures, however, the slaughter of game-birds showed signs of increasing rather than decreasing. More men had entered the profession. Out of the ordinary two-barreled, breech-loading shot-gun, a six-shot pump-gun had been evolved, and from this an automatic weapon which could be fired five times in succession by merely pulling the trigger. These weapons proved about as dangerous to birds as the old swivel-guns and nets. As a result prairie chickens began to follow the same road over which the heath hens had gone. Car-load upon car-load was shipped from the West to the Eastern cities. Ducks continued to arrive at the market in countless thousands. Shorebirds, golden plover, and snipe could be bought "dirt cheap." And all the while the city markets cried for more.

So great was the created demand that song-birds began to be treated like game-birds. Robins were killed in tens of thousands in the Southern States. One hundred and twenty thousand were shipped yearly from one small village in Tennessee. Bobolinks found great favor with the epicures. Three quarters of a million were sent from Georgetown, South Carolina, in one season. Millions were consumed locally. And other song-birds, such as snow-buntings and meadow-larks, were sold as game.

Market shooting had proved too profitable for the welfare of game. A certain hunter on Long

Island told the writer in 1907 that he had made as much as \$2500 in six weeks by killing ducks. At that time redheads brought two dollars apiece from the consumer and canvas-backs five; on the market scaup ducks were worth fifty cents and common scoters that much a pair. Yellowlegs and black-breasted plover brought three dollars a dozen.

Too many men were in the business, and birds grew scarce. Ruffed grouse a century before had been sold at two cents each; now they brought two dollars, and there were not sufficient to meet the demand. By 1910 a dozen quail were valued at five dollars, whereas a few generations ago it would have been difficult to obtain a few cents for them. Wild turkeys, which in Audubon's day brought twenty-five cents apiece, were no longer on the market. Professional hunters had actually ruined their own business by outdoing themselves in slaughter.

And by 1900 their last day was in sight. The public had suddenly awakened to the facts of the situation. The game-birds of America had virtually been destroyed. Then it was that the various States enacted laws to prohibit the sale of native game within their borders. But they failed to prohibit the marketing of that which had been killed *outside their boundaries*.

A heavy illicit trade in game was the result. Thousands of quail, grouse, and ducks shot in New

230 THE IMPORTANCE OF BIRD LIFE

Jersey or Maryland were sold with perfect security in New York. If they could be smuggled out of the State where they had met their demise, all was well. So long as they had not been killed in New York State, the game dealers had a perfect right under the law to dispose of them.

At last, however, the now famous Bayne Law, which prohibits the sale of American wild game and limits the sale of imported foreign game, was passed in New York. Within the next ten years every State in the Union but four had followed her example; and in the recalcitrant States—Colorado, Montana, Washington, and New Mexico—the sale of game-birds taken within the State is now forbidden.

The Federal Government in 1916 passed an act for the protection of migratory birds. The sale of any such, including water-fowls, shore-birds, snipe, woodcock, and rails, was prohibited throughout the United States. The knell of the market hunter had sounded. The profession in this country went suddenly out of existence.

5

An Economic Resource of the United States

Before closing it is necessary to add a few words concerning the number of game-birds now legitimately shot during the open season. Virtually all of these are eaten either by the gunner or his

friends, and, when lumped together, they demonstrate that game-birds still have an economic importance as a food product.

There were in 1911, according to Dr. W. T. Hornaday, more than two million and a half licensed gunners in the United States. Massachusetts and New York together issued 195,000 licenses. By 1920 that number had been increased in those two States by 70 per cent.—to a quarter of a million in New York and nearly one hundred thousand in Massachusetts. The quota of licensed gunners had increased in the other States in proportion, so that their total in 1920 may have approached four and a half million.

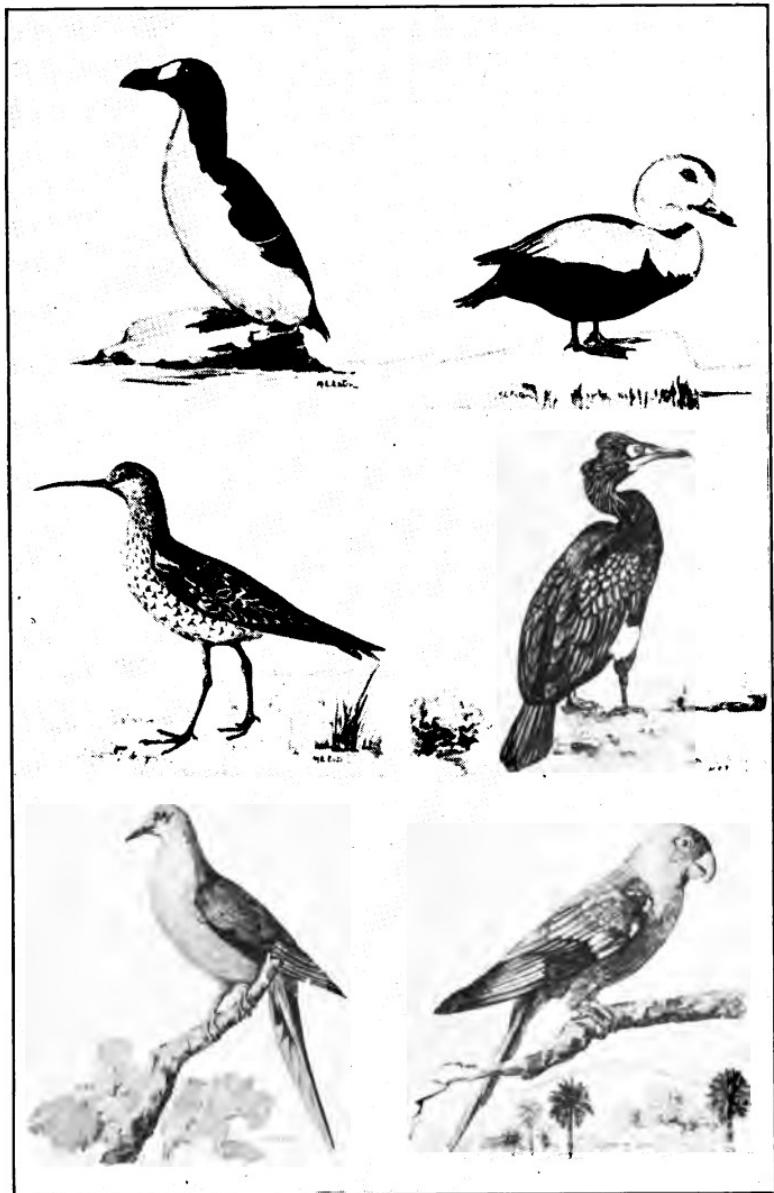
About 435,000 game-birds were killed in Pennsylvania during the season of 1919. As there were in that State less than four hundred thousand licensed shooters, the average to the gun was slightly more than one bird. The total weight of birds shot was estimated by the State Game Commission as 314 tons, an average of two pounds to the gun.

In Massachusetts, during the same year, each licensed gun obtained only one seventh of a bird, but as these were mainly pheasants, ducks, or geese, the weight to the gun was equivalent to half a pound of meat. The gunners of one inland county in New York shot slightly more than one pound apiece.

If every licensed gunner in the United States

232 THE IMPORTANCE OF BIRD LIFE

secured one pound of birds in 1919, there were a total of approximately 2250 tons killed that year. Taking 1919 as an average year, those game-birds, valued at fifty cents a pound, then mean an annual food resource of the United States worth \$2,250,000.

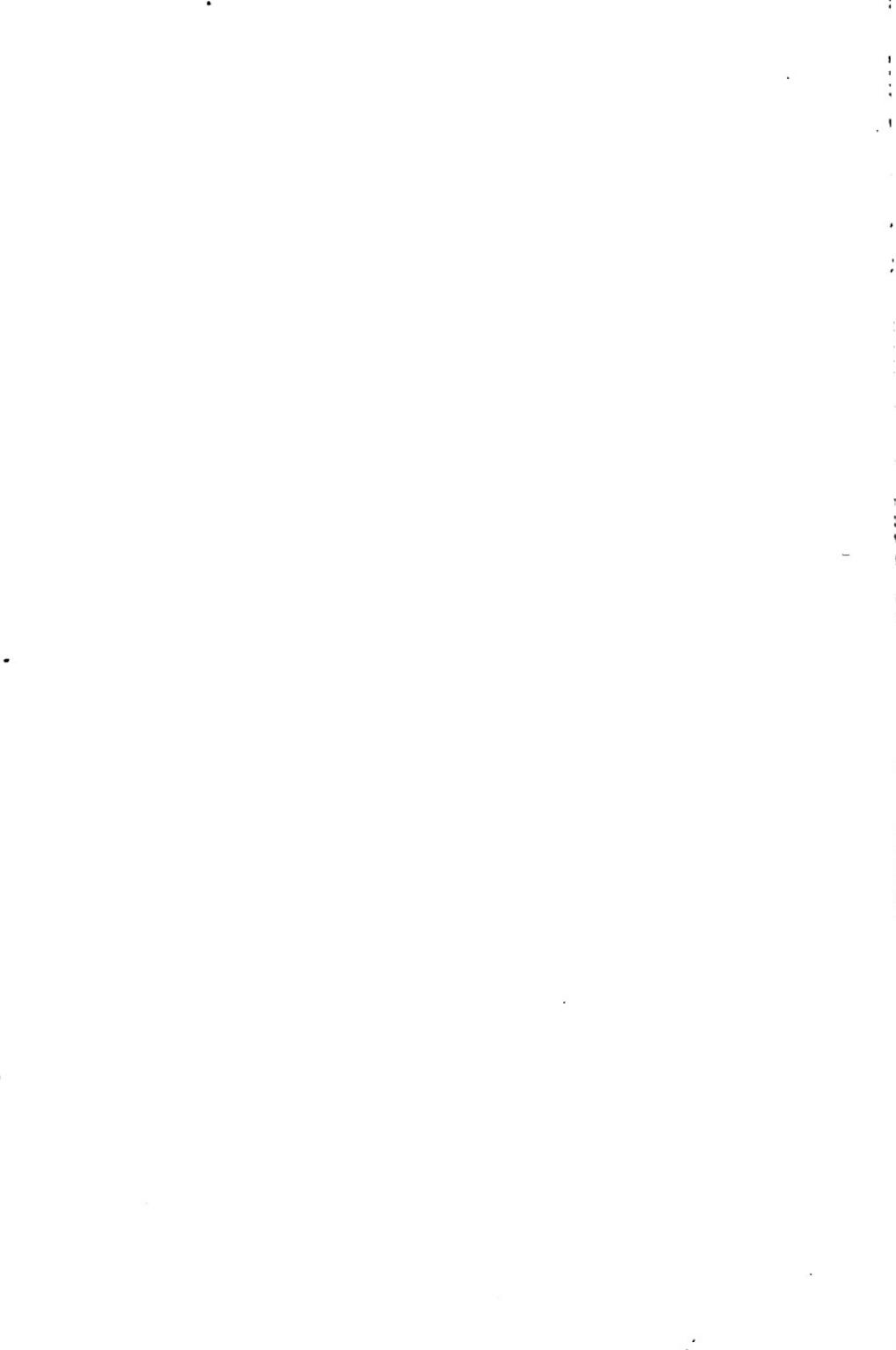


From "Our Vanishing Wild Life"

THE HUNT FOR DOWN, PLUMAGE AND FOOD EXTERMINATED THESE

GREAT AUK
ESKIMO CURLEW
PASSENGER PIGEON

LABRADOR DUCK
PALLAS CORMORANT
CAROLINA PARRAKEET



CHAPTER XII

GAME-BIRDS

1. Definition.
2. The Number of Game-Birds in the United States.
3. The Tragedy of the Water-Fowl.
4. The Tragedy of the Shorebirds.
5. The Tragedy of the Upland Birds.
6. Enemies of Game-Birds.
7. Protection and Conservation.

1

Definition

It is exceedingly difficult to hit upon a definition for game-birds which will meet with universal agreement. The majority of civilized countries have their own individual sets of game-laws and their own definitions of the characteristics considered necessary to place a bird on the game list. These characteristics vary, of course, according to the species which inhabit the region. Thus, many birds of Europe are accounted as game, which do not occur at all in the United States; the game-birds of South America are very different from those of North America; and the Australian game-birds differ from any others in the world.

Two countries with a common frontier may have diametrically opposite attitudes toward game. Popular tradition may have it that a song-bird

234 THE IMPORTANCE OF BIRD LIFE

in one country will be protected by the full weight of the law, while in the land across the way it will be a much-sought-for game-bird. Cases in point are Italy and France. Game-birds in France are strictly limited to a few orders or families particularly palatable when on the table. These are protected by long closed seasons, and the killing of any other species—except in parts of southern France—is prohibited at all times. Just across the border lies Italy with few or no game-laws. Birds there belong to the individual and may be slaughtered at will. France's song-birds, then, are Italy's game-birds.

In the broadest sense game-birds are any wild birds that are hunted as food. The early Egyptians feasted on ducks, geese, and storks; the game of the Romans included any bird that was edible; the dodo of Mauritius, later exterminated by swine, was used as food more than two hundred years ago by the Dutch; fully a century has passed since the last moa went to feed the Maoris of New Zealand; and the sandhill crane was long hunted in America until it was brought to the verge of extinction. These were all considered game-birds while their day lasted.

Any creature that would do for the pot! Such was the sad fate of birds in all civilized countries until the last century was well advanced. The first settlers in America found the region actually teeming with game of all kinds. For this they

gave thanksgiving; an abundance of meat meant the survival of their settlements. Centuries passed; the colonies grew and spread until they had overflowed the Alleghany barrier into the reaches of the Mississippi. Game was still plentiful; the forests were alive with ruffed grouse, turkeys, and quail; at times the sky was darkened by great flights of pigeons. Upon these vast hosts the colonial sportsmen could make no lasting impression with their ill-constructed fowling-pieces.

Feathered game, other than turkeys, actually held its own against the settlers for a hundred and fifty years. So plentiful was it that it was little affected by the growth of large towns in its domain. As an example of this, a New York newspaper in 1772 advertised for sale at auction a tract of more than a hundred acres situated near what is now 125th Street in that city, stating that it abounded with wild-fowl, including "ducks, geese, pigeons, quail, etc." In Massachusetts a bounty was for a time placed on ruffed grouse in order to save the crops which were being destroyed by the birds.

But within fifty years of the inception of the United States as a nation, several species of food birds had already grown scarce in some of the more densely populated States. With the arrival of the breech-loader their disappearance was more rapid. What large birds remained faced extermination; and the smaller ones commenced to be

236 THE IMPORTANCE OF BIRD LIFE

sought for. Reed-birds, robins, blackbirds, and pigeons proved almost as delicious to the palate as more legitimate game.

Laws governing the killing of birds gradually evolved in the various States, but these for a long time proved ineffective. There was no set definition of the difference between game and non-game birds. The story of France and Italy was reenacted. Robins and reed-birds were protected in the North and slaughtered in the South. What were considered song-birds in one State might be much-sought-for game in the next.

Finally, the American Ornithologists' Union stepped in to relieve the chaotic situation. It prepared, in 1886, a definition of game-birds which since then has been generally accepted by the United States as a whole. The definition was based entirely upon the natural grouping of birds and read as follows:

The following shall be considered as game birds: The Anatidæ, commonly known as swans, geese, brant, and river and sea ducks; the Rallidæ, commonly known as rails, coots, mudhens, and gallinules; the Limicolæ, commonly known as shore birds, plovers, surf birds, snipe, woodcock, sandpipers, tattlers, and curlew; and the Gallinæ, commonly known as wild turkeys, grouse, prairie chickens, pheasants, partridges, and quail.

The Biological Survey of the Department of Agriculture at Washington in 1900 expanded this

definition to read "ducks" for "river and sea ducks"; shorebirds, "including plover, woodcock, sandpipers, and curlews . . . "; and left out prairie chickens from the list, including them under the head of grouse. Under the Migratory Treaty between Great Britain and the United States for the protection of migratory birds in the United States and Canada, ratified in 1916, the definition of migratory game-birds included, besides ducks, shorebirds, and rails, cranes, such as the "little brown, sandhill, and whooping cranes," and pigeons. There is, however, a permanent closed season on all cranes, though many States still retain the mourning dove on their list of game-birds.

Birds as game, as defined by law in England, are far fewer in number than in America. Under the law they are "pheasants, partridges, grouse, heath or moor game, black game, and bustards"—two natural orders or groups, as against five found in America. These are official game, but shorebirds and wild-fowl, though not officially such, are treated as game and come under the Wild Birds Protection Act of 1880.

2

The Number of Game-Birds in the United States

According to the definition, and including the pigeon group, there are at the present time roughly

238 THE IMPORTANCE OF BIRD LIFE

170 possible kinds of game-bird in the United States. This, however, is a considerable overestimate of what sportsmen are actually permitted to shoot. Limitations have been placed on virtually every natural group, considerably narrowing the number of species eligible for the gun of the hunter.

Some forms have been removed for an indefinite period from the active game list; others are only temporarily absent. For example, the crane group has been placed entirely and for all time out of reach of the sportsman. Of the fifty or more species of ducks, geese, and swans, the wood-duck and several forms of eider-duck have been removed, probably forever, and swans have a long temporary respite. Quail, prairie chickens, and turkeys in many States are given closed seasons of five to ten years, or permanent exemption. Finally, out of the seventy-odd species of shore-birds and snipe, only six are eligible for shooting: the woodcock, Wilson snipe, greater and lesser yellowlegs, and black-breasted and golden plover.

Thus the number of game-birds residing in the United States that can be shot falls to considerably less than a hundred. Subtracting from these the several species of grouse and ptarmigan which inhabit only Alaska, together with those birds which are rare visitants to the border States from Mexico, there are left less than seventy-five bona-fide species to be utilized as game.

But the seventy-five are sufficient to meet the requirements of all sportsmen, if the sportsmen are not too prodigal with their guns. After our great object-lesson in destruction which took place during the last three quarters of a century, when 98 per cent. of our native game was wiped out, such a statement as the above is perhaps a bold one to make. But modern methods of legislation and conservation have satisfactorily demonstrated that it is possible to rejuvenate the reduced stock of game-birds to meet the increasing needs of the time. We have sufficient *kinds* of game-birds left, and if the sportsmen of the present and future will coöperate in their proper protection there will always be sufficient *numbers*.

3

The Tragedy of the Water-Fowl

This is not the place, however, to enter into a discussion of conservation and protection. Instead we shall describe some of the causes which led the United States to turn so seriously to them.

As has been stated, the early settlers discovered in America a veritable paradise of wild life, both animal and bird. The writers of that day were profuse in their expressions of wonder at its abundance. And most numerous of all were the water-fowl. The coastal bays were literally covered with ducks and banked with countless

240 THE IMPORTANCE OF BIRD LIFE

droves of snowy geese, swans, and brant. Their multitudes made an inspiring sight.

As the colonies grew older and became more firmly established, the settlers began to kill the water-fowl on a large scale. The demands of their increasing households called for greater slaughter. Many people owned slaves who had to be fed. Wild ducks and geese were cheap and not difficult to procure, being easily trapped. Thousands were slain for food. They became a staple article of diet for slaves and indentured servants. They graced the tables of the landed proprietors.

As a result of this excessive diet of water-fowl, the slaves on one estate in Maryland went on a strike, refusing to work until they received a promise that they should be fed no more wild ducks. And paid servants made an agreement with their masters that they should not be forced to eat canvasbacks more than twice a week!

But, great as the slaughter was, it failed to make a deep impression on the enormous flocks which inhabited the great bays of the Atlantic coast. The killing continued without abatement throughout the early days of the United States, but as late as 1882 rafts of ducks a mile long were still observed in Chesapeake Bay. And by that time, during the open season for the birds, ten thousand people daily gunned along the shores and marshes which fringe that water. They were now using breech-loaders, and the toll upon the ducks was heavy.

Bags of two hundred birds to a gun were not uncommon.

On the Pacific coast water-fowl were as numerous as on the Atlantic. Serious killing of them, however, did not begin until after the Civil War, but then, because of modern weapons, it proceeded rapidly. Snow geese in 1878 were so plentiful that crops to the amount of \$200,000 were destroyed by them in one county of California. As recently as 1906 two men shot 450 geese in one day; but now, sixteen years later, the birds are scarce. Not one tenth the number of geese and ducks that showed themselves in California during their annual migrations fifty years ago show themselves to-day.

The story of water-fowl in the Middle West has been much the same. Fifty years ago the lakes and sloughs of Michigan, Wisconsin, Indiana, and other Central States teemed with tens of millions of ducks. Every stream and marsh was the feeding-spot of great flocks; the valley of the Mississippi lay in the direct line of migration of the birds which breed in upper Canada and places further north. Throughout the autumn months a steady stream flowed slowly south, sometimes darkening the sky with its multitudes.

And these birds were killed by the hundred thousand. The pioneer settlers utilized them as food. Later, so-called sportsmen shot them for the sheer pleasure of killing and for their feathers;

breech-loading shot-guns spelled their death. With the development of the Middle West, duck shooting came more and more into fashion. Each slough, each marsh, and every small water-hole became lined with blinds which hid scores of gunners. So fast did the birds arrive at the shooting grounds that a man might fire continuously from daylight to dark, or until the barrels of his gun were too hot to hold.

There was little use for decoys in those days; the ducks were too numerous for the sportsmen to bother with putting them out. The ponds and sloughs were small—almost too small for all the ducks to crowd into. And seldom was the chance offered them except at night, and then their densely packed masses were likely to be mangled by the discharge of a cannon crammed with shot.

This slaughter in the Middle West continued for nearly two generations, increasing as the years progressed and as more deadly arms were developed. The result was inevitably the same as had overtaken the water-fowl everywhere else. Their ranks were thinned almost to obliteration. It is no longer possible for a man, even if he were permitted to do so by law, to obtain in two hours' shooting, a wagon-load of ducks. Thirty birds now represent a full and wholly satisfactory day's shoot.

The surviving remnants of this once incalculable fauna of water-fowl still inhabit our coasts

and inland waters. Ten years ago those remnants were meager indeed—a mere fraction of 1 per cent. of what they were a century earlier. Now, however, under the stimulus of revised State legislation and Federal protection, they show signs of recuperation; and it is possible that within another decade their numbers will be sufficiently recovered to preclude the possibility of extinction which so recently threatened.

4

The Tragedy of the Shorebirds

Shorebirds in America have followed the same trail as water-fowl. Their destruction was even more rapid than that of ducks, being accomplished in a much shorter time. The birds are comparatively small and therefore for years were considered unworthy of the expenditure of powder and shot. But, with the decrease of the supply of water-fowl and a proportionate enlargement of the army of market hunters and sportsmen, their doom was sealed.

There was a time, scarcely a generation ago, when the yellowlegs, black-breasted plover, golden plover, and curlews very nearly rivaled in numbers the great hosts of ducks. The Atlantic and Pacific coasts, Nova Scotia to Georgia, and Alaska to southern California, from July to November, literally swarmed with their southward-moving

throngs. Thousands of stilts, avocets, and curlews bred on the great marshes of California, and the great prairies were the home of more curlews. On the Atlantic shores the ocean beach appeared alive with countless millions of tiny, restless sandpipers, skirting the wave fringes on rapid twinkling feet, filling their little bodies with the minute crustacea which burrowed there. Great flocks of minute sandpipers ranged the salt marshes. Mud flats were the feeding ground of thousands of willets, curlew, robin-snipe, dowitchers, and stilts. And further inland the quiet of the fields was continually broken by the oft-repeated call of the Bartramian sandpiper and the "kil-kill-d-e-e-r!" of the killdeer plover.

But those days have been relegated to the past. Shorebirds have a nature too trusting for their own best welfare; they love too well the company of their kind. Their calls are not difficult to imitate; and these, arising from the lips of the concealed hunter, together with the attractive array of decoys he has arranged on the flat near his blind, are sufficient to entice the unsuspecting birds to their destruction. Nor do they seem to learn by experience to avoid gun-infested flats. Some species will return again and again to the wooden decoys, each time losing some of their number by gun-fire, until perhaps the flock is exterminated. Or, if excessively frightened the first time, they will leave that flat and proceed on their

journey southward, only to forget their experience before an hour has passed and plunge eagerly into the decoys at the next blind they come to.

It is not difficult, then, to understand why, in the days of unlimited game-bags, shorebirds lost the number of their mess. The tiny sandpipers, too small to shoot singly, could be mowed down by the score at a shot. The little surf sanderlings succumbed in the same manner, a hundred or two hundred constituting a day's shoot for one gun. Willets and curlew, because of their large size, were specially sought after, and some species met total extirpation. Robin-snipe (knots) were stupid enough not to be frightened by gun-fire and became virtually extinct ten years ago. Yellow-legs, black-breasted plover, and golden plover alone retain some semblance of their former numbers, but these have been woefully reduced.

Among the hills and valleys, on pastures and hay-fields, the upland plover met a like fate. The Bartramian sandpiper proved a warier bird than his brethren of the shore, but he finally fell victim to the gun in the hands of the farmer's boy. Killdeer still live, a remnant of their former strength, and at last are protected everywhere.

But, like the water-fowl, shorebirds, although their numbers were once brought to a low ebb by market gunners and over-ambitious sportsmen, are showing signs of recovery. The Federal Government rigidly protects them. Two species

of yellowlegs and two of plover alone remain on the shooting list. All the others are comparatively safe until their original numbers have been regained. And among those that return to our shores each spring and autumn in ever-increasing flocks are the curlew, knot, and willet, three birds which under short open seasons will provide excellent shooting for the sportsmen of the future.

5

The Tragedy of the Upland Birds

Turning now to the true game-birds, as defined by English law, we come to the most important group which inhabits America. Outstanding among them is the wild turkey, the monarch of all game-fowl, and following close after are the grouse, including prairie chickens, and the ptarmigan and quail.

When the *Mayflower* anchored off the coast of Massachusetts the wild turkey was to be found throughout all the forested regions of North America east of the Mississippi. But the size of the turkey unfortunately told against it. It was the only game-bird whose bodily proportions warranted the expenditure of a charge of powder and a bullet. Its flesh proved delicious and consequently was greatly sought after. As a result, even in colonial days, the turkey soon became scarce in the neighborhood of settlements.

Thus, with the progress of the years, it became relegated more and more to the backwoods. As the forests were cleared and the country developed it withdrew still further, until finally the native stock became entirely extinct in New England and, indeed, in all the northeastern States with the exception of Pennsylvania. Throughout the Middle West it has been extirpated—in Wisconsin, Iowa, Nebraska, Kansas, Oklahoma, and Texas. These States form a dead-line from the Great Lakes to the Gulf of Mexico and inclose a solid group of Southern territory where the turkey is still to be found in its native condition.

The turkey is naturally a wary bird, always difficult to find and never easy to stalk. Unlike the prairie chicken, it never congregates in great flocks and therefore does not place itself in a position to invite wholesale slaughter. To-day it is carefully guarded in all the localities where it lives, and in most States only gobblers are permitted to be shot.

There was once a day when the heath hen was one of the most plentiful game-birds in the northeastern States, but that day is long past. Like the canvasbacks of the Chesapeake, the heath hens were delicious eating and were slaughtered for the market without thought of the future. Hundreds of thousands were shot or netted every year in New York, New Jersey, and New England, until suddenly there were no more birds to kill. And

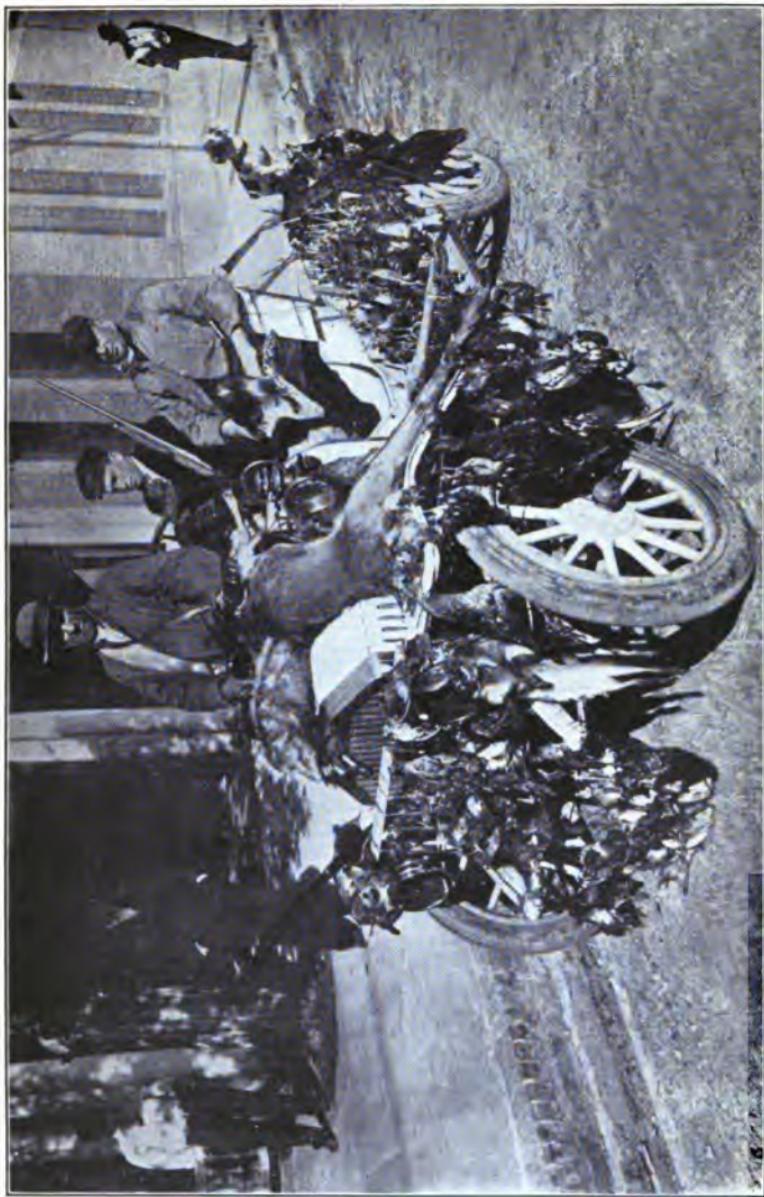
when the Eastern States awoke to the fact that something must be done to preserve the species, it was too late. The heath hens were gone. The remnant, a paltry few hundred, alone still survive at Martha's Vineyard in Massachusetts.

Prairie chickens barely escaped the same fate. Inhabitants of the open prairies, crouching to a pointing dog and present in indefinite numbers, they are particularly eligible for the gun in the hands of the hunter.

And as soon as the open land of the West had been settled, the hunter was not slow to take advantage of the opportunity presented him. Professional hunters first sold the birds to the trains of emigrants which in the fifties and sixties wound across the great open plains; then, as towns began to spring up, they disposed of them to the shopkeepers. Prairie chickens succumbed in thousands.

Presently they were shot for sport; and their habit of gathering in large flocks cleared the way for their destroyers. Once a flock was discovered, continuous shooting was assured for the day. It was a common custom for so-called sportsmen—in reality “game-hogs”—to drive to the shooting-ground in wagons and not to return home until the vehicles were filled with birds.

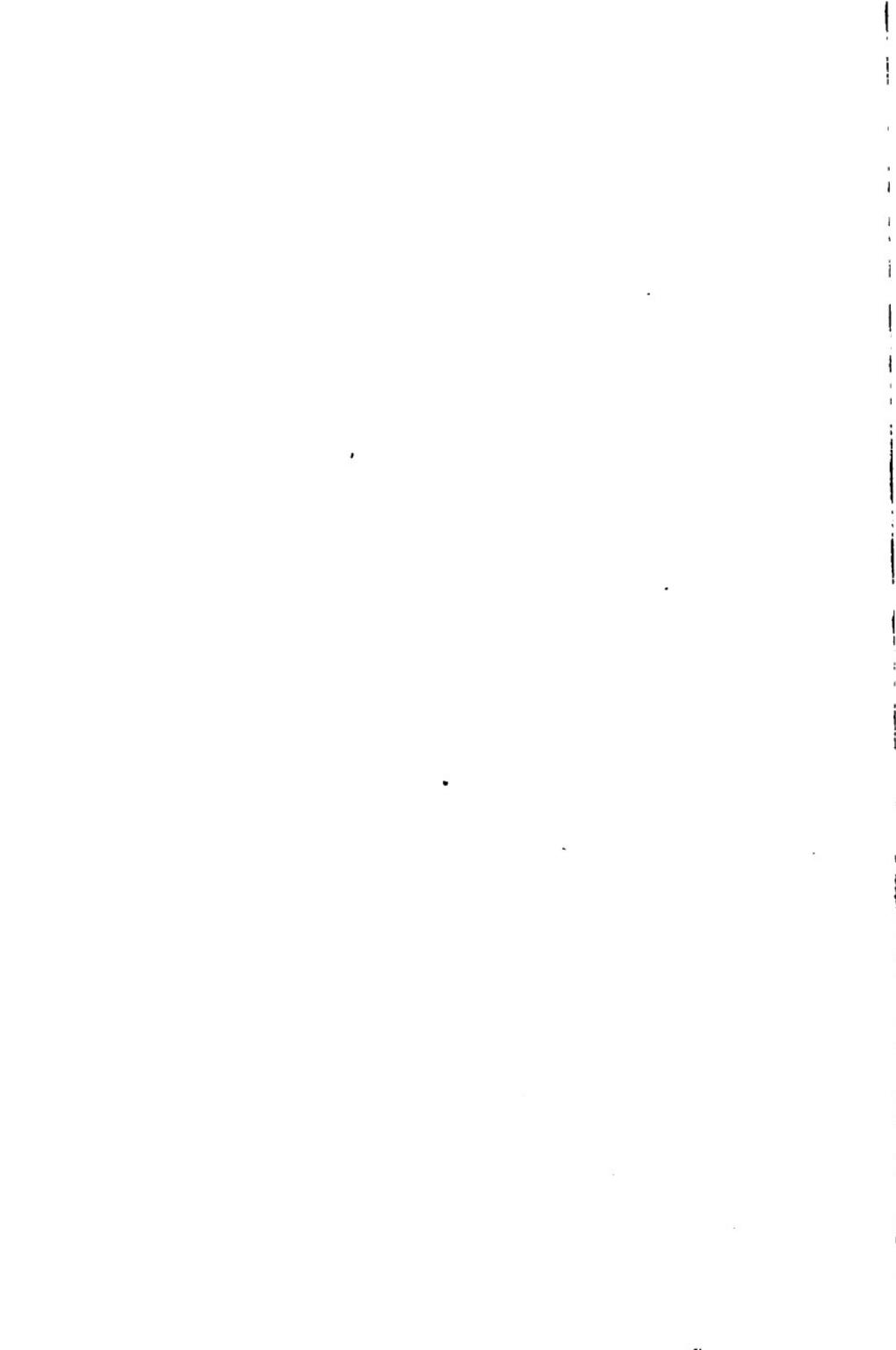
If automobiles had been invented while chicken shooting was in its prime, the demise of the species would have followed much sooner. Several



Courtesy of Dr. W. T. Hornaday

THE MARKET HUNTERS RETURN





trips to and from town could have been made in a day and there would have been no difficulty in filling the cars each time.

Prairie chickens indeed were unfortunate creatures, and yet, with the exception of the turkey, they were the finest game-birds America produced. Harassed by an ever-growing army of gunners who recognized this fact, but who through greediness would not relinquish their efforts toward extermination of the species, the birds were soon confronted by a second great enemy—the plow. The world had raised a cry for more wheat, and the alluvial soil of the prairies was responding. The boundless miles of thick sod were being turned into waving oceans of brown grain. The days of prairie-fowl were numbered; their nests were disappearing beneath the plow.

It perhaps was fortunate for the existence of the prairie-chickens that cultivation of the land did come. So great had been the slaughter from guns that their ranks had already been thinned; in some localities they had, indeed, been exterminated. Guns, without a doubt, would soon have accounted for their total and irretrievable eradication; but the process would have been gradual and scarcely seen by the sportsmen until it was too late to save the birds. With the arrival of the plow, however, the decrease of the chicken population was so rapid that the sportsman could not fail to observe it. The plow was something tangi-

ble to lay the blame against,—for what gunner could ever bring himself to blame his gun?—and before long legislative machinery was set in motion which finally led to a closer protection of the birds. The open season for shooting was cut short, and, as the movement toward conservation grew, shooting was entirely prohibited in some States. Thus to-day, though there is but the slimmest scattering of the birds left as compared with their former millions, it no longer seems possible that they will follow in the way of the heath hen.

In the ruffed grouse we find almost as excellent a game-bird as the prairie chicken. Unlike the latter, it is a denizen of the forest, a lover of glades and berry patches. And, with the exception of Kansas, it still persists in every State that was originally its native home. Its numbers, however, are not as large as formerly.

The colonials found the forests filled with birds but for many generations left them comparatively alone. It was with the arrival of the modern shot-gun that the grouse commenced seriously to suffer. Being naturally of a stupid, unsuspecting temperament, they at first took to the trees at the approach of the gunner and there easily fell victim to his aim. Millions were slaughtered in this way in a very few years, and in some localities the birds became scarce. The probable saving of their race was due to the fact that they dwelt in the deep-forest, which was penetrated only by the

big-game hunters. From this habit they obtained a sort of immunity, for the gunner would not spare time to hunt birds when there were bear, deer, or moose to be taken.

But in localities where their ranks had been greatly thinned, a rapid change seemed to take place in the temperamental character of the ruffed grouse. Its blunted sense of fear seemed suddenly to alter into extreme timidity. Where before the bird had stupidly listened to the hunter's footsteps with scarcely a thought that they might presage danger, it now became a wild, wary, vigilant creature, that took alarm while the gunner was still a hundred yards off. It developed an expert knowledge of the art of dodging behind tree-trunks during flight and running before dogs until a dense thicket could be reached where it was possible to rise unseen, startling the gunner with the roar of its wings and never offering him a shot. It has proved one of those rare wild creatures which, if left alone, rapidly grows tame, but which, if much hunted, learns even more quickly to dodge and keep out of the way.

It is due wholly to this quick assimilation of wildness that the ruffed grouse owes its longevity in thickly settled areas. In the forests of Maine and Michigan it is still plentiful and, because it is not over-hunted, appears tame and stupid. But let the sportsman enter the forests of New Jersey, the Blue Ridge, or even the scrub-

252 THE IMPORTANCE OF BIRD LIFE

oaks of Long Island, and while he may see or hear a dozen in a morning it is doubtful if he will obtain a full bag that day; and he will report that there are plenty of birds.

Now that the wild turkey and the prairie chicken have passed their zenith of popularity, the game-bird which supplied the most sport is the quail, represented in the East by the bob-white and in the West by the California quail and a few allied species. These birds are so insignificant in size that they escaped the weapons of sportsmen until the nineteenth century was well begun. Quail were immune while larger game remained near the settlements.

The day came, however,—first on the Atlantic seaboard, then further inland,—when turkeys had grown scarce, heath hens were extinct, and ruffed grouse had withdrawn deep into the wood. Then followed the attack on the bob-white, a bird of the open thickets. By 1900 virtually all the north-eastern States had been cleared of this native species. A remnant of its former numbers remained here and there in isolated districts, but the race as a whole was on the verge of extinction.

In the South, however, the bob-white held on. The cover there was denser, sportsmen were fewer, and there were still turkeys and other large game to be had. But, as the quail population waned in the North, sportsmen turned their attention southward. Virginia, the Carolinas, Georgia,

and Florida became vast slaughter grounds for the birds. Their numbers decreased, but the species clung to existence. Even to-day quail are still plentiful in the Southern States.

Next to prairie chicken, quail present to the sportsman the ideal form of upland shooting. They are to be found in the overgrown fields or low open thickets in coveys of a dozen to twenty birds. A pointer or setter easily picks up their strong scent. They are not difficult to trail and afford an opportunity for the dogs to show up at their best. When the covey is shot into it scatters temporarily in all directions; single birds are then difficult to locate and strain the ingenuity both of men and dogs. Bob-white quail afford both pleasure and exercise to the sportsman; but unfortunately, unless more stringent laws are enacted toward their preservation, there soon will be none left to shoot.

The same condition is true of the California quail. These birds have been brought within the last thirty years to the very edge of extinction. Unlike the bob-white, their coveys sometimes consisted of as many as five hundred individuals. Now the improvident gunner seldom sees more than one tenth of that number together.

The remaining groups of official American game-birds are small and of far less importance than those already touched upon. Rails are essentially marsh birds, and, although fifteen are

254 THE IMPORTANCE OF BIRD LIFE

listed as inhabiting the United States, only the Virginia and clapper rails hold any importance as game. They generally are shot when high tide floods the meadows which are their home, when they are prevented from running from the gunner and must seek safety in flight. Coots also belong to this same general group and in some localities are highly prized for their flesh.

Pigeons as game-birds are no longer important. Fifty years ago, when the passenger pigeons were so numerous as to darken the sun at times with their flocks, they afforded an excellent mark for slaughter; but those days are gone, and that bird is extinct. The killing of the Carolina dove is permitted in many Southern States, and until recently enormous numbers were annually slain. It was the custom to bait the birds by scattering grain. When the time was ripe a number of men would collect at the selected spot and thousands of doves would die. This practice, however, has been discontinued almost everywhere. Again, the band-tailed pigeon of California and neighboring States a few years ago bade fair to go the way of the passenger pigeon, but promiscuous shooting was stopped in time to save the species. The remaining birds of this group—mainly ground-doves—are immune because of their small size.

Enemies of Game-Birds

The weapons of man, however, are not the only agencies at work on the destruction of game-birds. Nature takes a hand now and then. Disease has been known to ravage prairie chickens, ruffed grouse, and quail throughout great areas of territory, almost extirpating the birds from the infected regions. The "grouse disease" has wiped out of existence tens of thousands of black game, grouse, and partridge in England and Europe. No less than ten million wild ducks have died within the last five years in the reaches of Great Salt Lake from an intestinal trouble caused by the chemical constituents of the water. The dead can be counted in the marshes by the thousand; they drift in great masses upon the lake surface, and the sloughs in some localities cannot be approached because of the horrible stench arising from them.

Fires, next to disease, account for great numbers of game-birds. The terrible prairie-fires which at one time swept across the plains carried destruction to multitudes of wild chickens. Not only were numerous birds burned, but their nests, eggs, and young were consumed. The great forest conflagrations in Maine and other wooded regions cause the death of thousands of

256 THE IMPORTANCE OF BIRD LIFE

ruffed grouse. Some localities, as, for instance, Long Island, have been swept virtually clean of these birds by the burning of their forests.

Next in importance come the depredations by birds of prey and vermin. Game-birds of the open lands are specially susceptible to their attacks. During the winter months, while snow lies deep on the ground, all ground-birds are particularly liable to attack from the air. Their dark bodies show up well against the white background of snow, and they fall an easy prey to hawks. It is believed that the shortage of ruffed grouse a few years ago in the northeastern States was largely the result of an influx of predatory birds, mainly the great-horned owl and the goshawk, from the North. These meat-eating birds were driven south in search of food by a shortage of snow-shoe rabbits in the North.

Lynxes, coyotes, foxes, minks, and weasels take a large toll of game-birds, although each one of them prefers some other kind of flesh if it can be easily obtained. Dogs, when permitted to roam at will, kill many birds, especially the young unable to fly, and destroy large numbers of nests and eggs. Domestic cats grown wild, however, prove the greatest enemies of small birds, including the quail. They annually kill and devour several million valuable birds in the United States, and probably are accountable for more damage to the

quail species than all the dogs, foxes, minks, and weasels combined.

As has already been mentioned, the destruction of nests by cultivation has played havoc among the prairie birds. It has also aided materially in decreasing the number of quail. Virtually all game-birds have the unfortunate habit of nesting on the ground. The eggs generally are deposited just about the time the farmer is sharpening his plow-points for the spring plowing, and the nests are turned under, usually without his knowledge of their existence. At harvest time his mowing-machine is ready to catch the later broods.

Finally, the automobile proves a deadly enemy of destruction. The employment of cars in hunting is a serious menace to the existence of all game. With its power of eating up the miles, a greater number of birds is brought within reach of the gunner than is to be had by walking. The bags of game are increased, and the birds face extinction sooner. Dr. William T. Hornaday states the case quite clearly:

. . . I have seen them in action. A load of three or four gunners is whirled up to a likely mountain-side for ruffed grouse, and presently the banging begins. After an hour or so spent in combing out the birds, the hunters jump in, whirl away in a dust-cloud to another spot two miles away, and "bang-bang-bang" again. After that, a third locality; and so on, covering six or

258 THE IMPORTANCE OF BIRD LIFE

eight times the territory that a man in a buggy or on foot, could possibly shoot over in the same time!

The use of automobiles in hunting wild-fowl is prohibited in North Dakota, alone of all our States.

7

Protection and Conservation

There is no bird-shooting sportsman alive in America who does not with a whole heart regret the demise of the heath hen, the Eskimo curlew, or the prairie chicken. He would give a great deal to sight one of those chickens over his gun-barrel, or sink his carving-knife once more into the luscious breast of a canvasback duck. He would delight in hearing the clear whistle of the bob-white in the fields back of his house. If he could shoot a wild turkey without having to travel to Arkansas or Florida to do it, he would believe that the millennium of the sportsman had arrived.

And yet he has permitted a blight to overtake his birds. There is only one remedy, and he himself must see that it is applied. That is increased protection and conservation of our wild game-bird resources.

CHAPTER XIII

GAME-LAWS

1. Laws of England.
2. Laws of America.
3. Evolution of Game-Laws in America.
4. State Game-Laws.
5. Federal Laws.
6. Effect of Game-Laws upon Birds.

1

Laws of England

The destruction of birds throughout the world for food has led to a wide diversity of opinion in different countries concerning their right to existence. The question involved is a serious one for the birds. Some nations have it that they are the property of the individual citizen; others regard them as owned by the State, or at least held by the State in trust for the people as a whole. It is upon the latter principle that all effective game-law systems have been built up.

In Italy, where all birds are considered the private property of any person who desires to take them, the Government is unable to make effective laws for their protection, even if it evinced any wish to do so. As free men the Italians claim the right to kill game whenever they please and wherever they please. Any attempt on the part of the

Government to curtail their liberty would be considered a controversion of the rights of all free citizens. As a result there is scarcely a native bird left on the entire peninsula of Italy.

Very different, however, is the attitude of that sport-loving nation, England. The principle upon which she acts is that the killing of birds is subservient to laws formulated by the state; in other words, that birds primarily belong to the state and only secondarily to the private individuals upon whose land they may be found.

The first English law for the protection of game of any kind was enacted during the time of William the Conqueror, forbidding the killing of deer by any persons except those who were of royal blood or who had special permission from the king. Later, in the reign of Richard II, deer or game-birds might be taken by socially fitted persons qualified by social position or by landed estates that brought them an income of more than £100 per annum. All game, however, was considered the property of the crown.

Although most of the early game-laws were manifestly unfair to every one but the ruling power, they at least prevented a swift extermination of birds and four-footed beasts. They embodied also the principle of state ownership of game, the foundation upon which modern British laws are based. Wild birds and animals now belong to the land, and the Government reserves

the right to devise laws for their protection and preservation. While landowners may claim title to any birds reared by artificial means, they cannot kill them except during specifically stated seasons.

Birds thus reared, however, belong to the land on which they live, and any income derived from them goes to the property holder. In this way considerable sums are returned either by the sale of dead game in season or by leasing the shooting privileges of the land. To give some idea of the actual value in terms of money of these "shootings," the gross rental of grouse moors in England and Scotland between 1905 and 1911 was estimated as returning £1,270,000 annually to their owners.

While this system of game-laws tends to make it difficult for any person not endowed with wealth to shoot, it prevents the extinction of upland game which would follow if, in such a densely populated country as England, every able-bodied man entered the field with a gun. Water-fowl, on the other hand, are entirely the property of the state, and any one may shoot them if he will pay the license fee required.

2

Laws of America

The present American game-law system, though

based on the same principle, that all birds belong to the state and not to the individual, differs materially from that of Great Britain. Owing to the immense territorial size of the United States and its comparatively sparse population, this country has been enabled to devise certain variations in the British system which are more equitable to the people as a whole. On the other hand, there are many excellent points of the British system which are woefully lacking in America.

The American form of government differs from anything else of its kind in the world. Our United States are literally States within a state, and each State reserves certain rights for itself. These States' rights, unfortunately, include, among other things, the power to make game-laws to fit their own requirements regardless of how they may affect neighboring States.

Thus, a generation ago, the closed season for ducks in Minnesota might be paralleled by an open season in Iowa, or vice versa. Woodcock might be shot in New Jersey during July, but not until September in New York. Birds which, during the migration seasons, traveled from one State to another could find no permanent peace, and a general thinning of their ranks was the result.

Upon the gallinaceous game-birds, such as grouse, turkeys, and quail, these ill-matched State laws did not have the same effect. The birds

were not migratory; they lived their lives in the locality where they were born, and they rightfully belonged to their home State. But with ducks, shore-birds, pigeons, and snipe the facts were entirely different; no one State could call them its own; they might visit a dozen States during the year.

This chaotic condition of State game-laws was finally recognized by the Federal Government as highly detrimental to the life of the migratory species, and after some hesitation the Government established game-laws of its own. It asserted that all migratory birds which traversed several States during the flying season were *its* property—that they belonged to the United States as a whole and not to any single individual State. Federal laws were accordingly passed for their protection.

These laws were presently upheld in the United States Supreme Court and now form the foundation of the present system of protection for migratory game-birds. The individual States, however, still retain their right to control the non-migratory species, whether native or introduced into their territory. Thus there are to-day two kinds of game-laws in the United States: the State and the Federal.

Dr. T. S. Palmer of the United States Biological Survey set forth in "Bird Lore" in 1902 a

264 THE IMPORTANCE OF BIRD LIFE

list of principles upon which the game-laws then depended.¹ These are much the same to-day, except that the control of some birds has passed out of the hands of the State into those of the Federal Government. Those slight alterations are indicated by italics in the following table of Dr. Palmer's principles:

(a) STATE LAWS

1. All *non-migratory* wild birds are the property of the state; hence:
 2. Killing of birds is a privilege, not a right.
 3. State ownership of birds carries with it the right to impose restriction; hence:
 4. Birds may be captured, possessed, transported, bought, or sold only under such conditions as the State prescribes.
 5. Landowners have no more right to kill birds out of season than other persons, unless the law specifically grants this privilege.

(b) FEDERAL LAWS

6. All *migratory birds, native or otherwise, are the property of the United States; hence:*
 7. *State restrictions concerning them pass to the Federal Government.*
 8. *Non-migratory birds are protected by the Federal law only when shipped from or into a State which protects them by a local law.*
 9. Birds killed or shipped contrary to law in any State cannot lawfully be transported to other States.
 10. Birds brought into a State become subject to its

¹ "Bird Lore"; Vol. III, pp. 79-81.

laws in the same manner and to the same extent as birds produced in that State.

11. Packages of birds shipped from one State to another must be marked so as to show the name of the shipper and the nature of the contents.

12. Foreign birds can be imported into the United States only under permits from the United States Department of Agriculture, and birds declared injurious by the Secretary of Agriculture cannot be imported into the United States or shipped from one State to another.

These, then, are the principles upon which our present game-laws work; but first, before entering into a discussion of their merits, let us see how they were evolved.

3

Evolution of Game-Laws in America

It is not quite certain when the first game-law was established and enforced in the American colonies. Sunday shooting, because of religious scruples, was early prohibited in several colonies. While the eighteenth century was still young, a short closed season for turkeys, heath hens, ruffed grouse, and quail had been enacted in New York. Massachusetts in 1710 prohibited the use of boats or canoes with sails, or boats dressed in grass, for the hunting of water-fowl. Gradually all the colonies developed some sort of code, so that by the close of the colonial period

at least twelve of them had enacted game-laws, insufficient though they were. These were the forerunners of the later State laws.

The early game-laws, though entirely inadequate for the true protection of game, were steps in the right direction. Although at the time of her inception as a nation the United States was the great exponent of the rights of man, she recognized from the beginning that game should belong to the state and not the individual. By incorporating her colonial laws as State laws she at once diverged from the line which Italy later was to follow—and ultimately saved a fraction of her game.

By the opening year of the nineteenth century fourteen States had made some attempt at game legislation; in 1850 nineteen had game-laws; in 1860, thirty-one; and by 1870, forty-one. But the laws were ineffective; their enforcement was lax, and little real protection was afforded to game. This applied to birds in particular; they were plentiful and little protection was considered necessary.

Reforms, however, were not far off. Beginning with 1872, the old system of long open seasons and "kill as many birds as you can" began to give way. In that year Maryland opened the new era by providing rest days for wild-fowl, an example followed by New Jersey in 1879, when she also prohibited the killing of water-fowl from

boats propelled by sail or steam. Market hunting was stopped in Arkansas in 1875, and a bag-limit law passed the legislature of Iowa in 1878. California and New Hampshire established game commissions in the latter year. Non-resident shooting-licenses were required in New Jersey by 1873—the same year in which New York published the first game-laws in pamphlet form—and in Delaware in 1879.

The reforms of the next decade were equally numerous. The model law for the protection of non-game birds was drawn up by the American Ornithologists' Union and acted upon by New York in 1886 and by Pennsylvania in 1889. Eighteen eighty-seven saw in Michigan, Minnesota, and Wisconsin the appointment of the first salaried game-wardens. In Wisconsin birds were no longer allowed to be shot for millinery purposes, and in Delaware there was to be no more hunting in the snow.

Michigan in 1891 regulated the training of dogs on game-birds out of season. Four years later the resident hunting-license system had been installed in several States, and by the end of the decade dove-baiting was prohibited in Georgia. The famous Lacey Act, regulating interstate commerce in game, became a federal law in 1900. Pennsylvania in 1907 placed a ban on the automatic shot-gun, being the first State to do so. By the end of the following year a number of States

had begun to pay attention to the propagation of game.

Then, in 1913, the Migratory Bird Act was passed by Congress, and in 1916 the international treaty between Canada and the United States, concerning the protection of migratory birds, was ratified. And finally, from the beginning of the twentieth century down to the present day, there has been given an increased amount of attention to the setting aside of federal and state game preserves. The cry for conservation now—1922—is making itself widely heard.

This, in brief, is the evolution of the game-laws of the United States. As soon as a reform was found to be of benefit in one State, it was taken up by others. And thus there has gradually arisen a good workable code applicable to all States, which, though needing in the future the addition of a few minor reforms,—such as the shortening still further of the shooting seasons and a narrower limitation of game-bags,—now proves equitable to sportsmen and game alike. The passage of the Lacey Act marked the beginning of federal control of game, a control which later was to prove greatly beneficial to migratory birds. It is doubtful, however, if the Federal Government can ever take over the management of non-migratory birds without infringing upon the so-called “rights” of States. But there is now little need

for it to do so; upland game is at last getting a "fair show."

As an example of modern methods in State protection of upland game-birds, let us take for a model the State of New York—exclusive of Long Island, which has special laws of its own. First, there is a closed season of indefinite duration on the mourning dove and the introduced Hungarian partridge, and bob-white quail cannot be shot until 1925. There remain only the ruffed grouse and introduced pheasant as local game-birds with any open season at all. In the case of the former bird, one month is allowed to the sportsman to secure his season's limit of ten, with the proviso that he shall take no more than two in any one day. The open season of the ring-necked pheasant runs four days only, and the sportsman may shoot three cock birds, but no hens. The pheasant is polygamous and therefore the cocks can be spared in considerable numbers without impairing the productive potentiality of the race. Although approximately a hundred thousand men hunt these two birds each autumn throughout the State, under the present system of narrow bag-limits and short seasons both grouse and pheasants are on the increase.

Long Island, which is a part of New York, has a set of laws applicable only to itself, and they are as bad and out of date as the laws of the rest of

270 THE IMPORTANCE OF BIRD LIFE

the State are excellent and advanced. Although the bag-limit is the same, the open season for ruffed grouse extends for two months; there are scarcely any grouse left on Long Island and there should be an indefinite closed season. Instead of *four days*, the shooting season for ring-necked pheasants lasts for two months, and the bag-limit is four cock-pheasants *a day*, or thirty for the season. Pheasants are nowhere numerous except in the immediate environs of the State game farm at Middle Island and on a few private preserves. They never will be unless they are given a chance to spread, an impossibility under the present law.

Unlike the rest of the State, Long Island still permits her quail to be shot. The birds are still numerous in a few localities, but under the present two-month open season they will not be for long. A five-year closed season before it is too late would bring them back to their numbers of twenty years ago; but a certain type of "sportsman" who believes in shooting *now*, without regard to future sport, has blocked all efforts to bring such a closed season about. To prove his point he makes such absurd statements as this, that coveys of quail, when shot into, scatter, and therefore populate a wider stretch of territory than before! And, because he is a "sportsman" and is supposed to know something of the habits of bob-white, he is *believed* by some people. Of

course the birds scatter when shot into. So do troops when they are being shelled; but they come together again. Except at breeding time,—which is not the shooting season,—no covey of quail will remain separated for more than twenty-four hours.

But this type of gunner is not relegated only to Long Island. He is still to be found in every State of the Union, and it was through his efforts that effective game legislation was blocked for many years. Happily he, like the sport he destroyed, is growing scarce.

But to return to New York: In order to be able to shoot on land other than his own, the sportsman must obtain from his county or town clerk a hunting-license. With this goes a celluloid button with the license-number inscribed upon it, which must be worn in plain sight when the gunner is in the field. A license purchased by a resident of the State costs \$1.10, whereas a non-resident license or one issued to an alien costs \$10.50. From this source New York was, in 1919, in receipt of \$247,847. The money is used for the further protection and conservation of game.

Under the Migratory Bird Law the United States is divided into two geographical zones whose seasons for shooting water-fowl and shore-birds differ. Zone No. 1, termed the breeding zone, comprises all the territory north of the fortieth parallel and the Ohio River, including

272 THE IMPORTANCE OF BIRD LIFE

twenty-five States. All States south of this line make what is known as the wintering zone. New York falls within the northerly zone; therefore its open seasons on migratory game-birds come within the earlier months prescribed by federal law, a law which also governs the bag-limits.

But, instead of permitting the Federal Government to enforce its own laws by itself, New York—as do all other States—coöperates with the Government. She has incorporated the migratory law as her own, and her own officers and wardens enforce the law. Thus any person who violates the federal law is also guilty of an offense against the State of New York.

For the enforcement of game-laws, New York maintains a body of nearly a hundred game protectors whose sole duty is to ferret out and prosecute all violations of what is known as the Conservation Law. Working in conjunction with the game protectors are the state constabulary, who are invested with full power to act. As a result, from three to four thousand violations are prosecuted every year with a return in fines to the State of approximately twenty dollars for every conviction. In 1919 about \$65,000 was thus brought into the State exchequer, to be used for the further protection of game.

State Game-Laws

Virtually all the state codes of game-laws are now constructed upon the same plan, that of New York being no exception to the rule. The essentials of these codes have been concisely summed up by Mr. Henry Chase in the following list of regulations:¹

(1) Providing proper open and closed seasons. (2) Prohibiting all unusually destructive means and methods of hunting, fishing, or exterminating game. (3) Providing a bag-limit, that is, limiting the amount of game allowed to each sportsman by the day and during the season. (4) Forbidding the sale of or traffic in game and regulating the transportation of same. (5) An Audubon Law, so-called, protecting at all times useful insectivorous birds not fit for food. (6) A license law compelling all those who hunt or fish to register and pay a tax. (7) Providing for the purchase and regulation of propagation farms, fish-cultural stations, and game refuges. (8) Establishing a game commission to enforce the laws and carry on the work of propagation.

We have already dealt with several of the necessary regulations. The provision for short open and long closed seasons has been admirably adopted by New York and several more States with excellent results. Under the federal Migratory Bird Law, which prohibits the killing of

¹ Henry Chase, "Game Protection and Propagation in America."

274 THE IMPORTANCE OF BIRD LIFE

water-fowl and shorebirds during their spring migration, the open seasons for these birds have been cut virtually in half, with a resulting large increase in their numbers and better shooting in the autumn.

But many States still have a long way to go in shortening seasons for their game-birds, if their sportsmen are to have any shooting twenty years hence. For instance, while most Southern States permit the shooting of wild turkey-gobblers only, the period allowed for killing them extends on an average over four months. The same applies to quail and doves. This prolongation of slaughter can only result in one end, extermination. On the other hand, such States as Tennessee, Texas, and one or two others, all well-stocked with native game-birds, have so shortened their open seasons that the presence of game is assured for all time.

The second provision of the common code is in one respect universally adhered to by all States. Game-birds can nowhere be taken in any other manner than by the use of a shot-gun or rifle held at arm's-length. The birds are thus assured a chance of escape which was wholly lacking in the days of great punt-guns and many-barreled floating batteries. The use of nets, traps, and power-boats is also universally discountenanced. It is unlawful in some States to carry a loaded gun in an automobile, in others it is forbidden to shoot from the highway or to employ a search-light for

shooting. The automatic shot-gun is banned both in Pennsylvania and New Jersey, a gun holding more than two cartridges being prohibited in the latter State. The automatic, the pump-gun, the automobile, the search-light, and other unfair means of taking game-birds will doubtless be legislated against throughout the entire Union within a few years. The fact that they have not already universally been done away with affords an argument for those in favor of exclusive federal control of game.

The need of narrow bag-limits is so obvious that it calls for no further discussion. The same may be said of the regulation forbidding the sale of game. And yet there are four States which still allow the sale of upland game-birds, and in one, Wyoming, native birds taken within the State may be placed on the market. The sale of migratory birds, however, is everywhere prohibited by federal law.

The Audubon Law, as drawn up by the American Ornithologists' Union in 1886, has been incorporated into the federal Migratory Bird Law, thus protecting all insectivorous birds not fit for game throughout the United States. This in a measure does away with the need for each separate State to have a similar law of its own.

Some kind of license law has been adopted by all States, but not all of them require their own citizens to have hunting-licenses. Non-resident

sportsmen, however, are universally required to have them. In the States whose residents are permitted to shoot without taxation, a person is generally allowed to do so only in his own county. If he desires to hunt in a distant portion of his State, it then is necessary to obtain a license. And some States demand a county license as well as a State license. Thus, for instance, in Maryland, if a man shoots only in his own county he is taxed \$1.50; but if he desires to hunt in other portions of the State he is compelled to pay \$5.10.

As in New York, the funds obtained from these taxes go toward state maintenance of game and fish. In other words, they go to further the carrying out of the last two provisions of the game-law code. Virtually all the States now have a special department to handle all matters pertaining to fish and game which happen to come under the jurisdiction of the local government. This department generally consists of a commission appointed by the governor of the State, although it may be a division of the Board of Agriculture or a division of a conservation commission, or, as in North Carolina, it may operate under the name of the Audubon Society.

The work of the fish and game department is everywhere the same. It appoints game-wardens and prosecutes violations of the law. It establishes fish-cultural stations, develops game-breed-

ing farms, and selects localities to act as refuges for game, which, however, can only be taken over as such by state legislation.

5

Federal Laws

The Lacey Act, the federal Migratory Bird Law, and the Migratory Bird Treaty have been mentioned several times in these pages without any specific record of their making. The first was introduced into Congress by John F. Lacey in 1900 as an attempt to stop the slaughter of game-birds which was then going on at a great rate throughout the United States. The States had claimed all the birds that lived in or passed through their territories, and were doing little or nothing to prevent their extermination. Passenger pigeons were gone, the heath hen was gone, prairie chickens were going, turkeys were disappearing, and quail had been entirely eliminated from some States. Soon all game-birds would be memories of the past. Non-game birds also were suffering from the depredations of plumage hunters, and they too would soon be effaced.

The Lacey Act, working through the Interstate Commerce Commission, merely prohibited the transportation by any common carrier of any bird or part thereof not specially listed in the act. Henceforth no plumage of wild birds could be

transported from State to State; the heron rookeries of the Carolinas could not be devastated to supply the New York millinery trade; and game-birds could not be killed to fill markets outside of the State. This was the first step of the Government toward central control of birds.

As far back as 1904, bills were presented to Congress proposing federal control of migratory game-birds. Their initial failure was due to the inclusion of game-birds in the list without mention of crop-protecting birds. Congress rightly claimed that the passage of such bills would prove of benefit to sportsmen only, and they were shelved for several years. The people to whom the protection of the insectivorous birds would be of inestimable value failed to become interested in the project, and therefore the game-bird bills were doomed before their inception.

Recognizing that this was so and being himself wholly in favor of protection in one form or another for all birds, Mr. T. Gilbert Pearson, head of the National Association of Audubon Societies, in the spring of 1912 addressed a congressional committee at a public hearing on three migratory game-bird bills. His speech brought out the fact that it was absolutely necessary to include insectivorous birds in such bills before they could become effective. Armed with voluminous statistics, he was able to drive this home to the members of the committee. Within a month, a new bill,



Courtesy of Dr. W. T. Hornaday

WILD DUCKS KILLED UNDER THE LAW



Courtesy of the
N. Y. Zoological Society

Photograph by
Elwin R. Sanborn

CANADA GOOSE AND HER BROOD OF GOSLINGS



known as the McLean Bill, including *all* migratory birds, had been introduced by the senator of that name.

The New York Zoölogical Society, in the autumn of 1912, opened an educational campaign for teaching the public the economic value of birds. Working with the Audubon Societies, together with a number of game protective associations, state game commissions, and newspapers and magazines, an appeal was made to the people for the passage of the McLean Bill. Articles and pamphlets by the score were published; the newspapers threw themselves heart and soul into the cause; and agricultural colleges took up the question. By the spring of 1913 the McLean Bill had become a law.

The McLean-Weeks Bill declared that all migratory birds belonged to the Federal Government and that individual States no longer held direct jurisdiction over them. The Department of Agriculture was authorized to fix closed seasons, having "due regard to the zones of temperature, breeding habits, and time and line of migratory flight . . .," and was required to enforce the new provisions concerning the killing and capture of the birds. The inadequate sum of fifty thousand dollars was set aside for this purpose.

While the new law was a great stride in the advancement of protection, it could never prove efficient until the breeding-grounds of the birds

came under its control. This, however, seemed an almost insurmountable difficulty. Virtually all the migratory game-birds reared their broods in Canada, and that country was also the home of many insectivorous birds. Unless these birds could receive protection in those northerly regions, the United States migratory law would be only partly effective; the United States would be conserving its bird life for the benefit of Canadian guns, just as France, Switzerland, and England conserve their stock for the Italian trappers.

With this knowledge fully in mind, Senator McLean introduced a second resolution into the Senate requesting the President to propose to the Governments of other countries a convention for the preservation and protection of migratory birds. Negotiations were immediately opened with Canada for the consideration of a treaty to that effect, but the breaking out of the war in 1914 delayed its consummation until 1916. Finally, in August of that year, it was ratified by the United States, and a few months later received the signature of King George of England. The treaty is now in force and is to continue fully operative for fifteen years from the date of ratification, with the possibility of further extension.

Under the terms of the treaty the contracting powers agree that there shall be a continuous closed season until 1927 on band-tailed pigeons, little brown, sand-hill, and whooping cranes,

swans, curlew, and all shore-birds with the exception of six species. The closed season of migratory insectivorous birds is made continuous throughout the duration of the treaty, and open seasons of prescribed length are laid down for game-birds. The United States, however, has failed to pass legislation to enforce the treaty, and there remains only the fifty thousand dollars a year under the old Federal Migratory Law to carry out its provisions.

It could not be expected that this wholly absurd amount would go far toward maintaining the national law, let alone the international treaty. But fortunately the majority of States accepted both law and treaty at their face value, and, far from fighting them, did everything in their power to further their enforcement. One State after another incorporated the provisions of the law into its own code and thus relieved the central government of much responsibility. In 1916 only five States out of the entire Union held that the law was unconstitutional in that it infringed upon state rights. Its constitutionality, however, was upheld in the Federal Supreme Court, and these States immediately afterward followed the example of the others.

6

Effect of Game-Laws upon Birds

Men who ought to know declare that the fewer

the game-laws, the more game-birds are produced. Never were truer words spoken. By one simple and brief code the Federal Government has not only succeeded in protecting nine tenths of the birds in the United States, but has done so in such a manner that those birds are actually increasing in numbers. Ten years ago it was virtually an unknown event for black ducks to breed on the marshes and pond-banks of Long Island, New Jersey, or Massachusetts. Now they may be seen there every spring and summer in scores. Wood-ducks, once nearly exterminated, are returning to their old haunts; gulls and terns crowd our coastal shore-line; and curlews are no longer an uncommon sight in the early autumn. For these birds the simplest law has indeed proved a boon.

Very different, on the other hand, has been the influence of a heterogeneous complication of state laws upon non-migratory upland game-birds. Until recent years each State formulated a code to fit its own needs, which in reality merely fitted the needs of a few sportsmen. The making of game-laws became a pastime, a mania, with state legislatures. So complicated did the laws grow that the citizens of a State could gather no more than an inkling of what they meant.

It might be unlawful, for instance, to kill quail in the northern part of one county whereas any number could be shot in the southern part. A similar law might pertain to all of a dozen coun-

ties scattered throughout the State. Citizens, once outside of their own county, could not tell where or when they could shoot. Hundreds of such confusing laws were passed in the ten years following the enactment of the Lacey Bill. Between 1901 and 1910, 1324 new state game-laws were promulgated; 316 of them in North Carolina alone.

There could be only one result arising from this over-discriminate legislation. Game-birds were destroyed. The legislative miscellany, though designed to protect, reacted in the opposite direction. Quail in the southern part of the county were killed off while there were none left to breed in the northern part.

Even under the more modern code, commonly adopted and simplified as it is, many States continue to enact numerous confusing local laws. Some of these perhaps are necessary; others are highly detrimental to the best interests of the game. Those which have to do with the establishment of refuges, sanctuaries, and breeding-farms are excellent, but those which leave a bird protected in half the State and unprotected in the other merely serve to lower the vital statistics of the species in question.

New York makes an excellent example of this short-sightedness. Quail were virtually exterminated throughout the main part of the State before a long closed season was put in force.

284 THE IMPORTANCE OF BIRD LIFE

There are still a few on Long Island, and these are permitted to be shot. By the time the Long Island birds are extirpated, the closed season in the rest of the State will be off. Now the question arises: Will there be enough quail in upper New York in 1925 to take the place of the exterminated Long Island birds? The answer is emphatically *no*. Without extensive restocking, there will be but a mere handful in the upper State. Thus, under the present system, the quail will soon be entirely eradicated from the State calendar of game-laws.

Although the different species of game scattered over the United States call for a wide variety of open and closed seasons, legislation concerning them need not differ in principle. As each year passes, States are coming to realize this more and more, and the time is not far distant when all game-laws will be in entire concomitance with one another throughout the Union. No thinking citizen or sportsman would desire to have an open season on his prairie chickens when those birds are protected by closed seasons in the surrounding States. The influx of eager gunners from those States would soon leave him with no game at all.

It is doubtful if, under the Constitution of the United States, the Federal Government can ever assume control of native upland game-birds. And

there will never be any need for it to do so, from the point of view of the game-bird, if the States synchronize their laws.

CHAPTER XIV

A CONSERVATION SKETCH

In several of the previous chapters we have endeavored to make plain the enormous economic value of wild birds to mankind: their bearing upon agriculture, their production of vast quantities of fertilizer, the commercial status of their feathers, and the value of their flesh as food.

The sum total of the actual cash value of bird life to humanity is staggering in its magnitude. Each land bird in the United States, if it has a life span of five years, has an estimated potential worth of seventy-five cents to the farmer; and there are, at a low figure, four billion such birds native to the United States. Some hawks and owls alone may be valued at seventy-five dollars apiece. In Peru the Government considers its guano birds as worth fifteen dollars each. The annual income of thousands of people in Iceland depends almost entirely upon the products of the eider-duck. Ostriches yearly bring about ten million dollars to the Boer farmers of South Africa. Thousands of game-birds are placed on the market in Europe during the proper season;

and in America, until a stop was put to it about ten years ago, millions of dollars' worth of water-fowl and upland birds were sold every autumn and winter. For instance, less than fifty years ago, before the passenger pigeons became extinct, a single town in Michigan in two years shipped birds to the value of \$4,000,000.

We have also attempted to outline the history of the destruction that followed in the wake of "civilization": how, through lack of knowledge and foresight, man depleted the ranks of the hawk and owl families; how his "feather" voyages created havoc among the down-bearing ducks of Labrador; how he carelessly wrecked the guano rookeries of Peru; how he exterminated birds for their plumes, only learning, when the ostrich was on the very verge of extinction, how to domesticate it; and, finally, how great avian populations have been wiped from the face of the earth because their flesh was tender and palatable, and easy to obtain. It has been a sad story indeed—one of which we have no right to feel proud.

Nothing could be sorrier than the picture of Italy stripped of its birds, unless it be America, the greatest natural bird paradise in the world, as it once approached that deserted state. Since the inception of Raleigh's colony in Virginia and the arrival of the *Mayflower* at Plymouth, there has followed the total extinction of no less than six of our native species: the great auk, Eskimo curlew,

passenger pigeon, Labrador duck, Pallas cormorant, and Carolina parakeet, all, with the possible exception of the cormorant, exterminated by the hand of man. Four of these died because they made excellent eating or because their feathers made excellent beds. The native parakeet was slaughtered for its bright-colored plumage. And, aside from the cormorant, they were all so numerous that no one dreamed that they *could* be exterminated.

To this casualty list may be added the names of the whooping-crane, sandhill crane, trumpeter-swan, American flamingo, scarlet ibis, Hudsonian godwit, upland plover, willet, black-capped petrel, red egret, heath hen, white-tailed kite, and ivory-billed woodpecker; thirteen birds so nearly extinct that some have not been recorded for several years. And there are also the roseate spoonbill, long-billed curlew, dowitcher, knot, snowy egret, great white heron, wood-duck, several species of hawk, an owl or two, and a score of other birds, the sight of any one of which in its native haunts, from its very rarity, now gives an ornithologist heart palpitations and thrills sufficient to last him a whole season. It is not overstepping the borders of conservation to say that 10 per cent. of the original species in the United States are now in a condition of virtual extinction, and fully 25 per cent. of once-common birds may be relegated to the "rare" list. Of the remainder, some have

always been rare; the majority have suffered woeful losses.¹

Such, then, is the status of birds in the United States to-day; but even at that they are better off a hundred times than only twenty years ago, before avian protection and conservation as an actual practice gained a foothold in America.

Conservation of its wild-life resources is now a policy of the United States Government, and for it as a national policy we have to give thanks mainly to two men, Theodore Roosevelt and Dr. T. S. Palmer. During the Presidential administrations of the former, no less than fifty-three federal bird refuges were established, to say nothing of several national bison-ranges and at least four national game-preserves. And it was the Biological Survey of the Department of Agriculture, under the supervision of Dr. Palmer, that carried out the work laid down by the President.

The conservation of bird life in the United States, although still only in the stage of infancy, is now fostered in the following ways: (1) Through the enactment of sane game-laws. (2) Through the education of the public to encourage the presence of birds around their homes and farms. (3) Through government or state wild-life refuges and sanctuaries. (4) Through privately owned preserves, refuges, and sanctuaries. (5) Through state game-farms for propagating

¹ For more detailed information, see Appendix.

290 THE IMPORTANCE OF BIRD LIFE

birds. (6) Through game protective and breeding associations. (7) Through Audubon societies. (8) Through wild-life protection societies.

The value of game-laws has been discussed and requires no further mention here. A word, however, needs to be said about education. Wild-life study is now being taught in most of the public schools of the United States. Children are familiarized with the common plants, trees, insects, animals, and *birds*. They are taught to recognize the commoner species and learn something of their habits. To further this work many States have set aside a "bird-day," similar to and often in conjunction with an "arbor-day," on which the public school children plant berry-trees or shrubs, build bird-houses, and make excursions into the woods and fields under the guidance of teachers to study close at hand what they have been taught indoors. In other words, there is a general trend of popular sentiment toward teaching the younger generations to take an interest in birds and other forms of wild life.

A number of agricultural colleges have also taken up the study of economic ornithology as a prescribed course in their curriculum; and the newer generations of scientific farmers are being educated in regard to the cash value of birds on the farm.

Lecturing staffs are maintained by the game commissions of various States. The lecturers

travel about the State equipped with interesting films and slides which explain better than words what is being done. Their views on conservation are also got to the public through articles printed in local newspapers or in pamphlet form; and some States issue regular monthly magazines setting forth the doctrines of conservation. The educational results of this work have proved far beyond what was hoped or expected.

Again, much of the teaching has been undertaken by the National Association of Audubon Societies and similar organizations. Small Audubon societies are scattered thickly all over the country wherever there happen to be a number of bird lovers living in one community. The object of these societies is not only to study birds, but locally and nationally to arouse public interest in them, to wage war against the human enemies of birds, and to seek legislation for their benefit. The national association maintains a staff of lecturers, as well as a large number of special game-wardens for bird refuges.

National bird refuges thus far established have been mainly for water-birds or as resting-places for migratory species on their way north and south. The land set apart has with few exceptions consisted of rocky islands or ledges, or tracts of marsh of no agricultural value, which would always have been waste land. These reservations have proved of immense value to bird life, pro-

viding homes free from molestation for millions of water-fowl and herons, which otherwise would now be extinct.

And, following the example set by the Federal Government, many States have purchased or otherwise acquired waste lands which they term game preserves, refuges, sanctuaries, or state parks, on which no further shooting is permitted. These lands, however, must not be confused with the sometimes gigantic state forest preserves where shooting, under certain conditions, is generally allowed.

Game refuges or sanctuaries are tracts ranging from a few acres up to several thousand. They are carefully guarded by wardens, sometimes heavily stocked from state game-farms, and serve as oases for game which gradually filters out beyond their boundaries to replenish the dwindling stock of the surrounding territories. Some refuges are actually owned by the State; others are merely held for a term of years under a lease; and still others may be protected for specific periods of time upon request of the owners.

Let us cite briefly what has been accomplished on the dozen or so reservations in the small State of Massachusetts. As soon as the land is taken over by the State, every effort is made to exterminate its varied population of vermin and to make it habitable for game. It is then restocked,

if necessary, with game-birds, and placed, if the size of the territory warrants it, under the control of a caretaker.

Perhaps the most famous refuge in Massachusetts is the Martha's Vineyard Reservation, on which live the sole existing heath hens. A few years ago a great fire destroyed something like two thousand of these birds, and for a time it was thought that the species would become extinct. Under careful management, however, the remnant saved from the fire had increased by the spring of 1920 to 600 birds, and now there seems to be little danger of their dying out.

In the Myles Standish Forest "wild life conditions . . . have improved each year since the installation of a permanent caretaker. Pheasants, ruffed grouse and quail have made a marked increase, though there were less than a dozen of either grouse or quail when the reservation was taken up. Pheasants have spread into all suitable covers, and two bevies of quail, fed through the winter, have bred well. Black ducks are quite numerous, and wood ducks are increasing, 25 being counted in one locality."¹ During the year 166 predatory vermin were taken on this reservation.

At the Moose Hill Bird Sanctuary, operated in conjunction with the Massachusetts Audubon So-

¹ "Annual Report of the Division of Fisheries and Game for the Year Ending November 30, 1920": Commonwealth of Massachusetts, Public Document No. 25.

ciety, "experiments in feeding and nesting devices and methods of attracting birds about the home have been continued, also the identification and card-cataloguing of wild-life,—now covering 700 species,—records of nesting birds, and daily ornithological notes. There have been 127 species of birds recorded, 71 of which have been found during the nesting season." Among those listed as nesting there were numerous black-duck, wood-cock, and quail.

The story of the other reservations is much the same. All have been stocked from the state game-farms. Without exception they show a definite increase in the ratio of wild life and, where it is permitted, better shooting for the sportsmen near their outskirts.

From Pennsylvania comes the report that despite the constantly increasing number of hunters a number of species of game show a steady increase throughout the State. And there are nearly 500,000 licensed hunters in Pennsylvania!

Under the Pennsylvania conservation system there are more than thirty game sanctuaries now in operation. The State has acquired considerably more than a million acres of wild land for the conservation of its water-supply, which it terms the state forest reserves. This land is a public shooting-ground, but within it are situated a number of sanctuaries, heavily stocked with game, on which shooting is absolutely forbidden. These

act as reservoirs to supply the forest reserves.

There are numerous sanctuaries situated in other parts of the State, not a part of the state forest lands, which are doing full duty; and apart from these are seven or eight auxiliary sanctuaries maintained by the State in conjunction with sportsmen. In 1920 more than \$56,000 was spent in stocking these refuges.

In encouraging their citizens to post their land against shooting, many States are helping efficiently to protect their game. Posting tends to lessen the number of guns in pursuit of game-birds and allows them a better chance to increase. It also is the beginning of many private preserves and sanctuaries.

Private game preserves, however, have never had the popularity in America that they have in Great Britain or Continental Europe. Until thirty years ago any man who sequestered his land from public shooting, reserving that privilege for himself, was considered almost a moral leper by the general run of American sportsmen. People believed that private land maintained solely for protection of game was un-American, a sort of throw-back to the conditions of feudal Europe. Some still consider that it tends toward class distinction, opposes development, deprives citizens of their rights, and creates a monopoly of hunting privileges.

But, with the passing of the game, those days

296 THE IMPORTANCE OF BIRD LIFE

of suspicion are also passing. It is now almost universally recognized that without human aid our game-birds will soon no longer exist. The private game preserve must henceforth be thought of as a means of increasing our wild life, of supporting, in some degree, our food supply, and of utilizing, to a much greater extent, waste places which are now of little value to any one. There are, for example, at least eighteen million acres suitable for this purpose in Connecticut, New Jersey, West Virginia, and Maine alone, a small fraction of which has already been taken over by the various States or by private owners as preserves. In New York more than a million acres have been dedicated as preserves, and the total in one or two other States reaches twice that area.

Private game sanctuaries run a parallel course with the shooting-preserves and really are of more importance to the longevity of the birds. Their popularity in America has arisen in the comparatively short space of ten years and doubtless will continue to increase as the public learns more and more how to care for its valuable bird life. In 1918 and 1919 "The People's Home Journal," a magazine deeply interested in the conservation of wild life, instituted campaigns among its subscribers for sanctuaries. The results were surprising and showed what a firm hold the idea of conservation already had on the minds of the American people. By 1920, merely through the



Courtesy of the American Game Protective and Propagation Association

THE RESULT OF CONSERVATION—DUCKS ON A KANSAS STATE FISH HATCHERY POND



Courtesy of the American Game Protective and Propagation Association

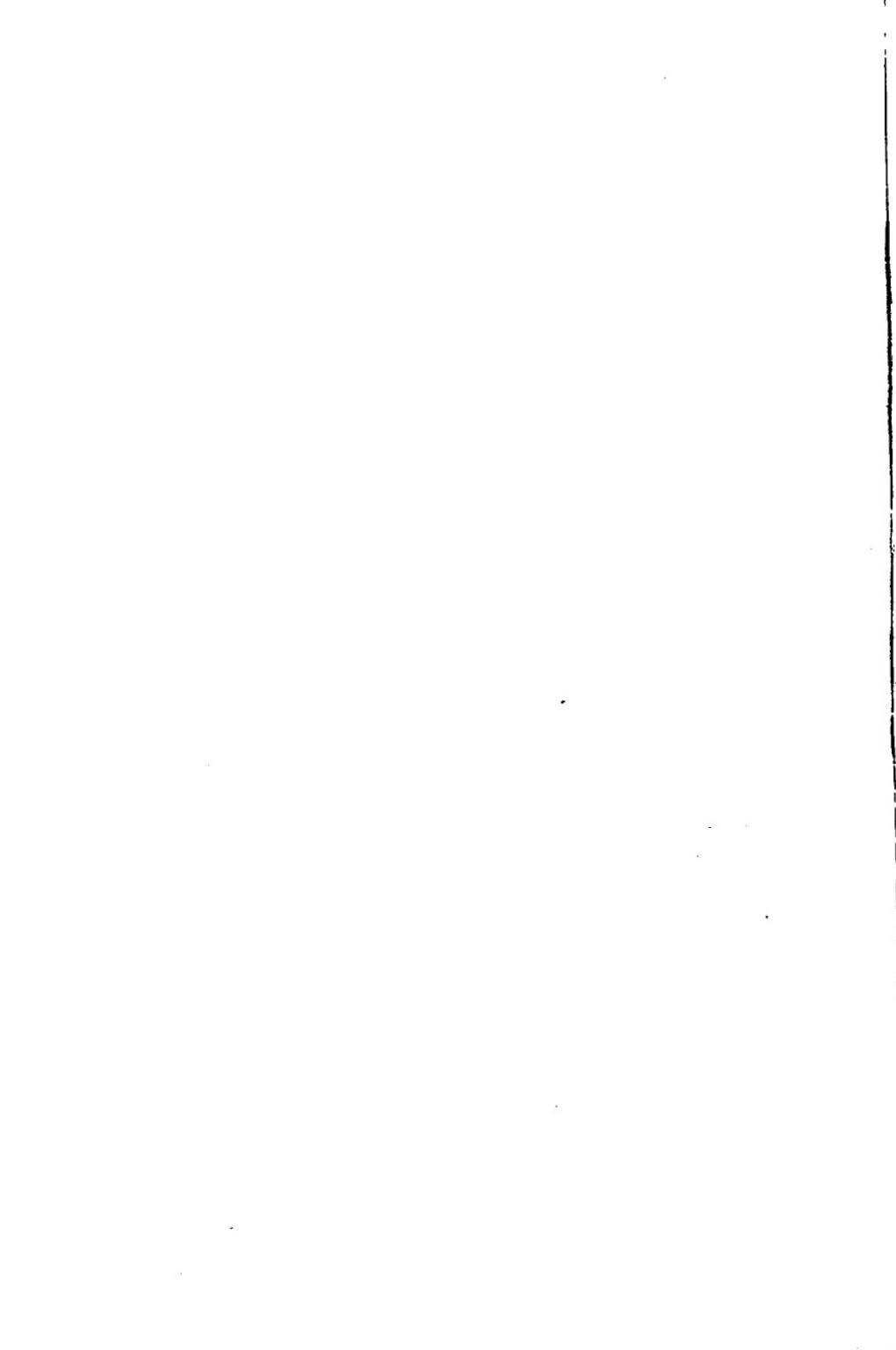
A VIEW OF THE REARING FIELD ON THE VIRGINIA STATE QUAIL FARM



Courtesy of the American Game Protective and Propagation Association

A FLOCK OF BOB-WHITES AND THEIR BANTAM MOTHER





efforts of this magazine, 6468 wild-life sanctuaries had been established! Inhabitants of forty-two States had responded, and, in all, 2,290,-997 acres had been set aside for this purpose!

While state and private refuges serve the purpose of protecting game-birds and others, and enable them to breed in comparative safety, they can be of little value if there are no birds there to breed. This too often is the case. The game has been extirpated from that locality in years past by over-eager gunners. Therefore a number of States have established game-farms for restocking these barren places and for supplying their constituents with birds for common shooting. There are also a number of professional game breeders who supply material for private preserves and sanctuaries either privately or publicly owned.

There are, in New York, three state game-farms, the oldest of which was established in 1910. Each farm comprises approximately 200 acres, and its chief product is ring-necked pheasants, those birds being ideally suited for stocking the game coverts of the State; but considerable attention is paid as well to the rearing of wood-ducks, black ducks, and mallards, together with quail, ruffed grouse, and turkeys. Hens are utilized for raising the pheasants, and every care is taken to insure natural conditions for the chicks to grow up under. After the chicks are four days

298 THE IMPORTANCE OF BIRD LIFE

old they are allowed to roam at will; but despite a natural tendency to run wild they will not leave their foster-mothers until nearly full-grown. When four or five weeks old the little birds are fully feathered out and able to care for themselves. They are, however, prevented from straying by being fed daily at the same spot.

A total of 55,400 pheasant eggs were distributed in 1919 from the state game-farms of New York free of charge, and 9206 half-grown birds were shipped out for liberation later in the season. The eggs were delivered mainly to sportsmen, with a few to interested farmers, and from them 18,791 birds were reared and liberated, making a total of 28,000 pheasants liberated in that State for the year. The number of eggs distributed in 1921 reached 103,300 and birds reared and released by the farms numbered 11,377. By far the majority of these eggs were shipped to clubs in lots of 1000 to 5000, and the number of birds raised and liberated from these ranged from 350 to 3300 pheasants for each lot.

The game-farms of other States have been equally prolific in their production of much-needed game-birds, but at present only about a dozen States are able to maintain farms. Some States, Pennsylvania and Illinois, for example, which thoroughly believe in the conservation of their game resources and which still have a little native game left, rely mainly upon the establishment of

refuges for the multiplication of their birds, without resort to propagation farms. If fresh game is needed to restock these covers, it is purchased from private dealers or breeders.

There are now about 10,000 game breeders in the United States. Some find it a very lucrative business, for the largest game farmers are prepared to sell as many as 50,000 game-bird eggs in a single season. Many thousand of live game-birds are sold every year to clubs, country places, and state game departments. Quail readily bring thirty dollars a dozen, their eggs selling from six to eight dollars a dozen. Ruffed grouse bring from ten to twenty dollars a pair, while turkeys fetch nearly twice that apiece. Mallards can be bought at from three dollars to three dollars and a half a pair, and their eggs at fifteen to twenty dollars a hundred. Pheasant eggs bring from thirty to fifty dollars a hundred.

Many other people rear the birds for the sheer pleasure they derive from seeing their lands restocked with them. Much of this private work is furthered by game breeding associations and protective societies, whose objects are to conserve game for the future and to educate the sportsman to raise his own birds. Several large breeding-farms are maintained by these associations, for demonstration, for experiment in rearing the difficult species of game-birds, and for stocking sanctuaries.

300 THE IMPORTANCE OF BIRD LIFE

It is largely due to the propaganda of these associations that the present intense interest among sportsmen for increased protective measures has arisen. The theory upon which they work is that upon the sportsman rests the chief onus of producing game for posterity. Once sportsmen are taught to look the future squarely in the face and to forget about the glorious past, except as a hideous object-lesson, they will begin to produce sport for their descendants.

The future of birds is now pretty well assured, not only in America, but everywhere else in the world. It has been stated by the highest authorities on the subject that the age of mammals is drawing to a close and fifty years more will see the last of virtually all the wild four-footed creatures. But, while twenty years ago a similar fate seemed to threaten the avian world, that condition has been greatly relieved. The world may yet see an "age of birds." Many species are still bound to pass away,—their "balance" has been upset and their numbers have been reduced below the danger-point, a blighted condition from which the species can never recover,—but other birds, if encouraged, will multiply in population to take their places.

The time is not far off when conservation of bird life throughout the world will overcome destruction, in the same way that it is beginning to do so in America. The world-wide traffic in plumage

is approaching an end; nearly all civilized countries have excellent and wisely devised protective bird-laws, laws which are improved every year by the governments which make them (Italy also is working to produce a code of such laws); and the mass of people are becoming educated to what birds are worth, financially and otherwise.

Birds have been found to be a national asset. They will therefore be saved. If they are able to hold their own and thrive in civilized communities,—regions which ordinarily mean death and destruction to wild life of every kind,—they certainly will survive in territories inhabited by savage peoples—a thing they have accomplished since im-memorial time.

APPENDIX

THE EXTERMINATION OF AMERICAN BIRDS BY MANKIND

The birds in the appended list were once numerous, either over the entire United States or in the more local regions which were their native habitat. Shortly after the arrival of the white man in America their extermination began, and this has been followed by total extinction for some species, complete extirpation from the North American continent for several, and the eradication from many States, where once they abounded, for many others.

Not included in the list are about ten or a dozen shorebirds, several species of heron, and a number of song-birds, which, while not wholly extirpated from any one particular region, are now universally rare. No birds except those which have definitely suffered at the hands of man are to be found on the list:

PASSENGER PIGEON

Once inhabited about forty States; now extinct.

CAROLINA PARAKEET

Inhabited about thirty States; now extinct.

LABRADOR DUCK

Once found along the Atlantic seaboard; now extinct.

IVORY-BILLED WOODPECKER

Inhabited about twenty-five States; now exterminated everywhere except possibly in Florida and Louisiana.

PILEATED WOODPECKER

Inhabited thirty or more States; now exterminated in at least four States, and exceedingly rare in most others.

WHOOPING CRANE

Once inhabited about thirty-five States; now possibly to be found in two, Louisiana and North Dakota.

SANDHILL CRANE

Once found in about twenty-five States; exterminated in all but six, where it is exceedingly rare.

GREAT AUK

Inhabited the northern Atlantic seaboard; now extinct.

ESKIMO CURLEW

Once found in thirty or more States; now extinct.

LONG-BILLED CURLEW

Once inhabited thirty-five or more States; now seen casually in fourteen.

FLAMINGO

Found in the Gulf States; now exterminated in America.

Roseate Spoonbill

Found in the Gulf States; now exterminated in America.

Scarlet Ibis

Found in the Gulf States; now exterminated in America.

Snowy Egret

Once inhabited at least forty States; now exterminated in all but eleven, and rare in those.

Heath Hen

Once abundant in northeastern States; now exterminated everywhere except on the state reservation at Martha's Vineyard, Massachusetts.

Wild Turkey

Once found in nearly forty States; now exterminated in at least seventeen, and rare in most others.

Upland Plover

Once abundant in the Atlantic and Middle West States; now exterminated in at least seven, and rare in all others.

Trumpeter Swan

Now exterminated in ten States; rare everywhere else.

Wood Duck

Now exterminated in five States; rare everywhere else.

Ruffed Grouse

Now exterminated in three States.

The following species have been exterminated in

one State or more: RIDGWAY'S QUAIL, DICKCISSEL, NORTHERN and WHITE-NECKED RAVEN, WHITE PELICAN, AMERICAN SCAUP DUCK, WOODCOCK, GOLDEN PLOVER, OYSTER-CATCHER, BLACK-THROATED BUNTING, HARLEQUIN DUCK, HUDSONIAN GODWIT, LEAST TERN, EASTERN WILLET, and PINNATED GROUSE or PRAIRIE CHICKEN.¹

¹ The above data were compiled mainly from "Our Vanishing Wild Life," by Dr. William T. Hornaday.

INDEX

- Accipiterinae*, Employed in falconry, 119
Aeroplane, Pigeons flown from, 109
Albatross, Distribution, 5
Slaughter on Laysan Island, 167
Eggs taken as food, 222
Guano, 222
Aldrovandi, on breeds of fowl, 63
American Army, Employment of pigeons in, 104-5
Captures pigeons from Germans, 107
Trains pigeons to fly by night, 108
American Guano Co., Organized, 206
American Ornithologists' Union
Campaign to end feather trade, 169
It draws up the Audubon Law, 170
Defines game-birds, 236, 267
Amphibians, Number of species, 5
Anchovy, Great numbers eaten by guano birds, 199
Argentina, Ostrich farms of 181
Armada, An apparatus for killing wild duck, 227
Audubon, John James, Observes enormous flocks of wild pigeons, 6
Audubon Law, Adoption of, 170
Incorporated with federal Migratory Bird Law, 275
Audubon Societies, National Association of, Founded, 172
Campaign for bird protection, 278
Automobile, Employed as an accessory to shooting, 257
Use as such prohibited in some States, 258, 274
Bag-limit, controlled by law, 275
Baiting pools for ducks, 147, 225
Bats, Producers of guano, 196
Battery, Employed in shooting water-fowl, 226
Bayne Law, Enacted, 230
Belgian Homers, 96
Belgium, The center of pigeon flying, 96
Pigeons captured by Germans, 107
"Bird-day," Established in some States, 290
Bird-lime, Employed for capturing small birds, 152
Birds of paradise. Character of plumes of, 156
Hunted for their plumes, 167
Birds, Number of species, 5, 6
Diseases of, 8, 255
Destruction of insects by, 11, 12, 32, 42, 53
Destruction of rodents by, 36, 37

- Destruction of fruit by, 41, 42
 Destruction of grain by, 43
 Effect upon vegetation, 13-18
 Effect upon locust plagues, 31
 Enemies of, 9, 10
 Man's destruction of, 287-289
 Money value of, 48-50, 286
 Bird-organ, Use of in training canaries, 137
 Bison, Vast herds of, 6
 Blackbirds, As grain eaters, etc., 42-44
 Bluebird, 53
 Bobolink, 44, 236; marketing of, 228
 Brahma, Origin of the breed, 66
 Breeding of birds in captivity, 184
 Brown Thrasher, 53
 "Bullet," The pigeon holding the world's record for 1000-mile flight, 98
 Bullfinch, Training it to whistle, 137
 Numbers imported to U. S., 138
 Cabbage butterfly, 29
 Call-bird, Used to lure others into a cage, 153
 Employed by Italians, 216
 Call-ducks, Uses of, 146
 Canary, Distribution of wild, 135
 Breeds, 136
 Importations into U. S., 138
 Methods of shipment, 138
 Natural color, 135
 Training, of, 136
 Employed in the detection of noxious gases, 143
 Canker worm destroyer, 33
 Cannon, employed by market hunters, 226
 Caribou, Vast herds of, 6
 Castings ejected by hawks, 126
 Cat, an enemy of game-birds, 256
 Catbirds, The number of, 53
 Census of birds, 51
 Chase, Henry
 Code for state game-laws, 273
 Cherries, Destruction of by birds, 41
 Chestnut blight carried by birds, 121
 Chili, No guano beds in, 204
 Chili-saltpetre, Origin of, 197; nitrate beds of Peru, 204
 China, Bird nests eaten in, 223
 Chincha Islands, The home of guano birds, 198, 199, 202. History of, 202
 Destruction of guano beds, 203-4, 208
 Mortgaged to private corporations 208
 Cholera, Transmitted to pigs by vultures, 21
 Cock-fighting, 60, 61
 Cockatoos, As pets, 140
 Collodion, Messages written on for carrying pigeons, 103
 Color, Of feathers, 157, 158
 In domestic pigeons, 91
 Columella, On breeds of fowl, 63
 Compañia Administradora del Guano
 Scientific methods of protecting guano birds, 210
 Condor, Sought for feathers, 168
 Conservation
 Policy of U. S. government and factors governing, 289
 Its future in America and the world, 300
 Cormorant, 99
 Food of, 19, 20, 199
 Life history, 200

- Producer of guano, 199
Rookeries on the Chinchas, 200
Trained to catch fish, 131
Crawfish, Destruction by herons, 55, 56
Croix de Guerre, Awarded to a pigeon, 107
Crow, 42, 45, 53, 58
Trained to talk, 142
Dead crows as lures for hawks, 151
As food, 218
Curling irons used to shape ostrich plumes, 183
- Darwin, Charles
On duck breeds, 82
On the origin of domestic pigeons, 87, 88
Decoys, Artificial types, 146
Crows used to entice hawks, 151
Live decoys, 147
Employed against ducks and shorebirds, 145
Stuffed owl used, 152
Digestion of seeds, 13, 14
Disease, Among birds, 20, 21; among game-birds, 225
Birds as carriers of, 21
Dixon, Dr. Samuel G., Eradication of mosquito larvae by, 54
Dodo, Destruction of, 234
Down, Commercial, 186
Where obtained, 186
Eider-down, 188
Manufacture, 192
Duck, Domestic, 82
Possibility of wide variation in, 82
Breeds, 82
Muscovy duck, 84
Production of down, 192
- Ducks
Wood, 55; Mallard, 54;
- Green-winged teal, 54,
Muscovy, 84.
Speed of flight, 99
Shot for the market, 227.
Slaughter of, 240
Duck-shooting, 145-148, 242
Dutcher, William, Founder of the Audubon Societies, 171
Dyeing, of ostrich plumes, 183
- Eagle, Used in falconry, 117, 130
The quarry of, 127
Feathers used in the millinery trade, 162
Educational work in ornithology
In schools, colleges, by game commissions and Audubon Societies, 290
Eggs of birds used for food, 213
By the Eskimo, 213
By the Icelanders, 190, 219
Gull eggs used, 218
Depletion of rookeries, 220
Vessels outfitted for egg raids, 220
Marketing of bird eggs, 221
Egret breeding in captivity, 185
Egret farms, The non-existence of, 185
Eider-down, Method of obtaining, 190, 191
Eider duck
Distribution, 189
Eggs as human food, 189
Rearing in Iceland, 189
Semi-domestication in Iceland, 190, 191
Slaughter for down along the Labrador coast, 187
England
Pigeons used during war, 104
Scope of millinery trade in, 165; its suppression, 175

INDEX

- Birds killed for food in, 217
 Game preserves, in, 217
 Definition of game-birds in, 237
Eskimo, His use of bird eggs as food, 213
Evolution of game laws in the U. S., 265
Extinction of birds, 302-5.
Eyes, The training of an, 121
Falcon, Number of species of, 117
 Flight of, 118
 Use of a dog in training, 124
 Quarry of, 127
Falconry, 114
 History of, 114-16; as a noble sport, 116.
 Types of hawks employed, 117-20
 Terms used in, 120
 The training of the hawks, 121-25; their food, 126; 127
 Ancient laws pertaining to, 128
 Modern falconry, 129-31; in India, 130; Turkestan, 129, Siberia, 130
Farallone Islands, Their rookeries depleted by egg hunters, 221
Feather dusters, Manufacture of, 194
Feather Voyages, 187
Feathers, Origin, structure and types of, 154-7
 Employed by savages, 160
 Artificial, 174
 Their use as down, 186
 Their use in the manufacture of toys, etc., 194
Federal Migratory Bird Law, 44
 Permitting Indians and Eskimos to kill birds, 159
 Passage of the Act, 230, 263, 268, 278-80
 Interpretation of the law, 271
Coöperation in the law by the States, 272
Federal ownership of birds, 263
Field-mice, 36, 37, 38, 49
Filoplume, Description of, 156
Fire, A cause of mortality among game-birds, 255
Fish, The number of species of, 5
Flight of birds, Speed of, 99
 Their destruction by birds, 19, 20
Fly, Artificial, Manufactured from feathers, 194
Fowl, History of and breeds, 61-63
 Artificial selections of, 66
 Feathers utilized as down, 186, 192
France
 Pigeons employed during war in, 103, 105
 Laws governing the killing of song birds, 214, 215
 Game-birds in, 234
Franco-Prussian War, Messages carried from Paris by pigeons during, 103
Game-birds
 The number of in the U. S. and number of gunners, 231
 The value of birds, 232,
 Their definition, 234; in England, 237
 Number of species in the U. S. 238
 Mortality of, through disease, 254; through fire, 255; through vermin, 256;

- through cultivation of the soil, 257; through use of automobiles, 257.
- Their increase under present laws, 282
- Game-breeding, Number of establishments in the U. S., 299
- Prices obtained for live game-birds, 299
- Game-cock, 59
- Game-farms
- State farms, 294
- Description of New York State farms, 297.
- The production of game-birds, 298
- Game-Laws.
- History of in England, 260
 - Theories on, 259
 - Effect of State laws upon birds, 263
 - Evolution of in the U. S., 265
- Reforms, 266
- Laws of New York State, 269; of Long Island, 270.
- Game code of U. S., 274.
- Weaknesses of the American game-laws, 282
- Game-preserves, History of, 295
- Private preserves in the U. S., 296; their merit 296
- Gannet, as a producer of guano, 199, 201
- Goldfish, employed in eradicating mosquito larvæ, 55
- Goose, Domestic, 80
 - History, production of, and breeds, 80-82
- Production of *pâté de foie gras*, 81
- Commercial down from, 191
- Geese reared especially for plucking, 192
- Goose, Wild
- Graylag the forefather of domestic breeds, 81
- Canada goose under domestication, 82
- Use of live decoys in shooting, 148-50
- Slaughter of, 241
- Goshawk, 127, 123
- Grain destroyed by birds, 42, 43
- Ground birds easy prey for hawks, 256
- "Grouse disease," The virulence of, 255
- Grouse, Ruffed, 46
 - On the market, 226
 - Bounty placed on, 235
 - Slaughter of, 250
 - Its alteration of habits, 251
 - Open season for, 269,
- Guano, Definition of, 196
 - Constituents of, 197, 198
 - History of, 202; introduced to Europe, 203; sought by U. S., 205-8;
 - Amount exported from Peru, 209
 - Amount now produced by Peru, 211
 - Value set on guano birds, 211
- Guano Act, Passed by Congress, 207
 - Results of, 207-8
- Guinea-fowl, 83
 - History and production, 83
 - Maintained on farms in places of dogs, 142
- Gulls, 58, 162
 - A monument raised to, 31
 - Easily lured to the gunner, 150
- Hawk
- Cooper's, 9, 39, 119
 - Duck hawk, 39, 117
 - Goahawk, 9, 39, 119

INDEX

- Kestrel**, 118
Merlin, 127
Osway, 131
Peregrine, 117, 126, 127
Pigeon hawk, 39, 117
Red-shouldered, 10, 39
Red-tailed, 10, 39
Sharp-shinned, 9, 39, 119
Sparrow, 10, 11, 39, 117
- Hawks**
 Descent upon rodent hordes, 38
 Food of, 38, 39
 Value of in money, 49
 Trained by Germans to capture homing pigeons, 103
 Feathers used in millinery, 162
- Heath hen**, The slaughter of the, 225
 Former numbers, and their slaughter, 247
 Survivors at Martha's vineyard, 248; partially destroyed by fire, 293
- Heron**, as a destroyer of crawfish, 56
- Humboldt Valley**, The rodent plague of, 38
- Iceland**, The eider-down industry of, 189-91
- Ichneumon-fly** as a parasite, 28
- Imprisonment** for stealing a falcon, 129
- Incubator**, used in hatching ostrich eggs, 178
- Insects**, The number of species of, 11, 12
 As food for birds, 11, 12, 22, 32, 33
 Their destruction by Nature, 12
 Parasitical, 12, 28, 29, 32
 Rate of production, 27
 Vegetable eating, 27, 28, 32
 Predatory, 28
- Iridescence** in feathers, 158
- Italy**
 Destruction of birds for food in, 214
 The killing of birds on a scientific basis, 216; methods employed, 216-7
 Game-laws of, 212, 234
- Jackdaws** As talkers, 142
Jungle Fowl, The Red, 61
- Kestrel**, A poor bird for falconry, 118
Kingbird, 53
- Labrador duck**, Its slaughter for down along the Labrador coast, 187
 Its extinction, 188
- Lacey, Act**, 173; its enactment, 267, 277
- Landowner**, Rights to game in England, 261
 Renting of shooting rights, 261
- Laws.**
 France, 214
 Norway, 217
 Sweden, 217
 England, 217, 260
 United States, 222, 227, 230, 243, 250
 Prohibiting the sale of game, 229
- Laysan Island**. The attack upon its albatross rookery, 166
 Guano deposits on, 208
 Corporation formed to take eggs from, 222
- Leghorn fowl**, Origin of, 66
- Lemmings**, The migration of, 37
- Licenses** issued for shooting, 231
 Law first established, 267
 How to obtain a license in New York State, 271
 Laws concerning, 275

- Lobos Islands, The home of guano birds, 198
Mortgaged to private corporations, 208
Locusta, Plagues of, 31
Lost Battalion located by pigeons, 106
Lure, The falconer's, 122

Magpie, As a talker, 142
Mammal, Number of species of, 5
Man, Superior to beast, 158
Market hunters, Development of the profession in the U. S., 225
Income of, 229
Marketing the game
In England, 218
Value received, 218
Sale prohibited, 230
Martha's Vineyard, 248, 293
Maryland experimental farm, 33, 34, 42, 43
Mattress, Chicken feathers employed in making, 192
Merlin, Food of the, 127
Messages carried by pigeons, 102
Milliner trade, The development of the, 163, 171
Numbers of birds killed to supply the, 164
Its struggle against suppression, 171-2
Millinery Association, 174
Minas, As talkers, 142
Mistletoe planted by birds, 16
Monaco, Pigeon shooting at, 95
Monkeys eaten by hawk-eagles, 18
Moose Hill Bird Sanctuary, 293
Mosquitos destroyed by ducks, 54
Moultling of ducks, 187
Murphy, R. C., Reports great cormorant rookeries, 7

Murre, Depletion of rookeries by egg hunters, 221
Myles Standish Forest, 293

Napoleon, established game-laws, 214
Nests, Edible bird, Description and value, 223-4
New York Zoological Society, Educational campaign for the passage of a Federal Migratory Bird Law instituted by, 279
Night, Pigeons, trained to fly to red light at, 108
Night-hawk, 53, 54
Nitrogen, Its content in guano, 197
Norway, Protection of birds in, 217
Nutmegs spread by fruit pigeons, 16
Ostrich
Character of plumes, 156
Hunted down, 168, 176-7
Eggs used as food, 176
Bred to captivity, 177; production, 178; breeding habits, 178; artificial incubation, 179; plucking, 179, 181
Number of plumes per bird, 179
Manufacture of plumes, 182-3

Ostrich farming in the U. S., 181
Number of birds used, 181, 184; their value, 181
Development of the trade, 183; its failure, 184
Osprey, Trained to fish, 131
Owl
Great horned, 9, 39
Screech, 39
Barn, 39
Long-eared, 39

- Short-eared, 39
 Owls, Their descent upon rodent plagues, 38
 Their food, 39
- Palmer, Dr. T. S., Principles of game-laws set forth by, 264
 Work in conservation, 289
- Parrots,
 Kea parrots attacking sheep, 47
 Amazons as talkers, 140
 Macaws as talkers, 140
- Partridge
 Its speed of flight, 99
 As quarry in falconry, 125
 Used in training falcons, 123, 125
- Pekin duck, 83
- Pelican
 Possible use of in fishing, 133
 Production of guano by, 199
 Rookeries on Lobos Islands, 201
 Life history of the, 201
- Pennsylvania, State conservation system excellent, 294
- Penguin, 5, 7
 "People's Home Journal," Its campaign for bird refugees, 296
- Peregrine, Its distribution, 117; food, 126
- Peru, The home of guano birds, 198
 Wealthy because of nitrate and guano beds, 204-5
 War with Chili, 205
 Exhaustion of guano deposits, 208
- Petrels, 5
- Phalaropes, 5
- Pheasant
 Gives warning of Zeppelin raids, 143
- Shooting season and bag-limit for in New York States, 269
- Pigeon
 Difference between pigeon and dove, 87
 Fruit pigeon, 16
 Crowned pigeon hunted, 167
 Mourning dove as a game-bird, 237; the baiting of, 254
- Pigeon, Homing
 Speed of flight, 99
 Development of homing instinct, 100
 Training of, 100-1
 Use in Franco-Prussian War, 103; in World War, 104
- Pigeon loft, 100, 111; in war, 106
- Pigeon milk, 111
- Pigeon, passenger, 6, 8, 45
 Vast flocks and their destruction, 226
 Market value of, 226
- Pigeon shoot in New Jersey, 95
- Pigeons, Domestic, 86
 Historical, 86
 Ancestry, 87
 Breeds, 87, 88, 89
 Fan-tail, 90
 Runt, 91
 Colors, 91
 Tumblers and rollers, 92-3
 Shooting of, 93-5
 Flying of, 96
 Distances flown, 98
 Record flights, 98
 Homing birds, 100
 Training of, 101
 As messengers, 102
 Use in war, 104-9
 Accustomed to gun-fire, 106-8
 Trained to fly to red lights, 108
 Squab-raising, 110-12